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ILLUSTRATIONS.

The Abbeys of Great Britain.—XVII.—Dore.—Drawn by Mr. R. W. Paul.....*Double-Page Ink-Photo.*
Plan of Dore Abbey.—Drawn by Mr. R. W. Paul .....*Double-Page Photo-Litho.*
Competition Design for Royal Insurance Buildings, Liverpool.—By Mr. J. Belcher, F.R.I.B.A. .....*Two Double-Page Ink-Photos.*

Blocks in Text.

Plan, Austin Friars ..... Page 295 | Details, Abbey Dore ..... Pages 298-29

CONTENTS.

The Institute Brickwork Tests 289	Abbey Dore..... 298	Sanitary and Engineering News 304
Local Authorities and New Buildings in Rural Districts 290	Competition Design for Royal Insurance Buildings, Liverpool.. 300	Foreign 304
Notes 291	Archæological Societies 300	Miscellaneous 304
A Lost Leader 293	Engineering Societies 301	Capital and Labour 305
The Royal Institute of British Architects 293	Competitions 301	Legal 305
Austin Friars and its Cloister 295	The London County Council 301	Meetings 305
The New Mosaics at St. Paul's 296	The Student's Column: Carpentry and Joinery.—XIII. 301	Recent Patents 305
Association of Municipal and County Engineers 297	General Building News 302	Some Recent Sales of Property 306

The Institute Brickwork Tests.

AS most of our readers are aware, the Science Standing Committee of the Royal Institute of British Architects have lately been conducting a series of experiments to ascertain the ultimate crushing load of brickwork columns, so that the relative strength of such may be compared with the resistance possessed by the individual bricks of which they are composed. At the meeting of the Institute last Monday evening the report of the first series of experiments was read and discussed, and it must be admitted that very considerable success has attended the labours of those who have for many months devoted so much of their time and energies to increasing our knowledge on a subject of vital importance both to architects and engineers. Before these experiments were commenced there was no accurate information available upon the matter; and although it was, of course, well known that the strength of brickwork was much less than the individual strength of the bricks of which it was composed, yet there was practically nothing to guide anyone in proportioning a pier to carry a given load when only the strength of the bricks it was composed of was known.

In ordinary buildings, where the bases of the walls are necessarily of ample dimensions, it is not of so much consequence to know their absolute strength; but where great weights are to be carried upon a limited base, as in the case of piers supporting heavy girders carrying the floors of warehouses, and in such-like constructions, it becomes a matter of the first importance to know what load per square foot can be safely adopted.

The employment of iron and steel-work for our largest buildings has, of late years, become so usual that it is more than ever necessary to have definite information as to the carrying capacity of brick piers, since the first effect of using girders is to localise the weight of the buildings, and often to bring immense loads upon portions of brickwork which until now could not be proportioned in accordance with scientific requirements, but were necessarily made of great size and strength, because it was not known how much it would be safe to reduce them.

At first sight it appears to be a comparatively simple thing to ascertain the breaking weight of various specimens of brickwork, but as the matter is more carefully considered the difficulties in carrying out experiments of this character become more and more apparent—one of the greatest being to decide where such tests should end. To begin with, various kinds of bricks should be used, and no series of experiments would even approach completeness unless London stocks, gault, Staffordshire blue, and Leicester red bricks were represented. Then, again, some of the brickwork should be built in mortar and some in cement, and it would also be necessary to ascertain the qualities of these materials. Besides this, there should be at least two tests made of each different kind, to be sure that the results were trustworthy; and the time the brickwork had been built would be, of course, a most important factor, and at once suggests conducting the experiments at intervals of, say, three, six, and nine months. It will, therefore, be seen that it is much more difficult to limit than to make the tests. All these points have been, however, thoroughly considered by the Committee appointed to carry out the experiments, and these gentlemen are, in our opinion, to be congratulated as much upon the choice of material to be tested as upon the able manner in which the tests have been conducted.

It was thought that a fair comparison between bricks and brickwork would be ascertained by first testing the individual bricks and afterwards testing piers about 18 in. square and 6 ft. in height, composed of similar bricks, some built in mortar and some in cement. These preliminary facts having been decided, it was necessary to procure a machine for testing the piers, and as it was thought that those which were composed of Staffordshire blue bricks, built in cement, would require a very considerable load to break them, it was considered necessary that the apparatus should be capable of exerting a pressure of at least 500 tons. A testing machine capable of safely exerting a pressure of this amount upon a specimen 6 ft. in height is a tool of a rather formidable nature, requiring to be specially designed for the purpose, but the Committee in this respect were much assisted by Sir William Arrol, who placed a suitable hydraulic apparatus at their disposal.

As a practical illustration, it might be mentioned, in passing, that a load of 500 tons would be probably three times as great as the combined weight of all the members of the Royal Institute of British Architects; and it now appears from the tests already made that a pedestal 6 ft. in height and but 18 in. square, composed of Staffordshire blue brick in cement, would have sufficient strength to support the weight of the whole Institute, although it would not have, we must admit, the factor of safety which we should consider the nature of the load would demand.

The building of the experimental piers was commenced on July 24, 1895, and finished on August 13. These were built upon wrought-iron plates resting upon a temporary line of rails about 140 ft. in length, laid to a 16 in. gauge. By this arrangement the piers could be easily drawn along the rails into the required position for testing. The testing commenced on December 9 last, and sixteen piers were broken between that date and the end of the month. A considerable number of piers still remain to be tested, and it is to these tests, at the end of ten months, that the Committee attach the most importance, as giving the strength of the brickwork when the mortar is more mature.

The general results of the experiments are very clearly shown in the table on the following page, which was hung on the wall at the meeting, and which is a kind of reduction of the detailed results to a general average.

It would appear from these tests that brickwork is not so strong as it has generally been assumed to be. It is true that only some five months elapsed between the building and testing of the piers, and when those which will have been built ten months come to be broken they will show considerably greater strength. But in ordinary building work a very large proportion of the ultimate load is liable to come upon any pier after it has been constructed five months.

Great care was taken to ensure that the building of the piers was such as might be fairly called good ordinary work, and it appears to have been the special aim of the

TABLE OF AVERAGE OF RESULTS.

—		——	In Mortar. Commence to fall.	In Mortar. Final Collapse.	In Cement. Commence to fall.	In Cement. Final Collapse.	Average Strength of Single Brick.
			Tons per sq. ft.	Tons per sq. ft.	Tons per sq. ft.	Tons per sq. ft.	Tons per sq. foot.
	2	London Stocks	4·18	10·41	7·22	16·03	84·27
3	11	Gault	5·00	21·82	6·98	17·98	182·2
4	12	,, ...	6·16	22·03	7·08	17·51	...
5	13	Leicester Red	15·20	29·93	17·87	67·36	382·1
6	14	,, ...	16·11	31·55	21·82	49·54	...
7	15	Staffordshire Blue.....	22·43	69·22	29·45	84·47	701·1
	16	,, ...	21·42	79·39	16·91	61·14	...

Committee, both in this respect and in the choice of materials they have used, to produce specimens resembling, as far as possible, the class of work met with in every-day practice. There is no doubt this was a wise course to adopt, and one likely to make the results they were about to obtain particularly valuable. It might, of course, have been possible to construct piers of greater strength than those which have been broken, if carefully selected materials had been used, and their building had been subjected to the most rigid inspection. But such specimens would not have represented the ordinary class of work with which we have in nearly all cases to deal, and would therefore have furnished results of but little use to the profession.

The strength of the individual bricks, as well as that of the lime and cement used, was ascertained by Professor Unwin, who also made some experiments with the testing machine, to discover what allowance should be made for the friction of the hydraulic press employed. It was desirable to bring the load upon the specimens very gradually, and great care was exercised in allowing the water to enter the press very slowly. The actual pressure at any moment was shown by means of two hydraulic gauges, one registering low and the other high pressures.

A series of very interesting photographs were taken of the specimens during and after the tests, and these were reproduced on Monday evening upon the screen at the Institute. It probably occurred to many of those present that had one of the latest developments of photography been employed, so that the various stages of breaking through which each pier passed could be shown, the views would have been even more satisfactory, and as many members of the Committee were generally included in the photographs, we should have had the additional advantage of studying their expression, as the load was gradually increased. To stand near a brick pier, supporting 200 tons, and likely to fly into a thousand pieces at any moment, is not an occupation likely to be chosen by those who have not a laudable desire to increase our knowledge of a very interesting subject.

The difference between the crushing of separate bricks and that of a pier composed of the same bricks, as brought out by Professor Unwin's tests on single bricks, is very remarkable. One would, of course, expect a great difference, but it is rather startling to find that while the highest crushing loads of the piers composed of Leicester red bricks ranged from 29·93 to 67·36 tons on the square ft., the crushing loads on separate bricks of the same class ranged, according to Professor Unwin's tests, from 311·4 tons to 591·4 tons per square foot, and other classes of bricks gave similar proportionate results between the single brick and the pier. This forcibly illustrates the amount of the self-destructive force which comes into play in a pier composed of a number of bricks bonded together, when subjected to heavy pressure. It is not a mere question of the joints giving, for we observed that in some of the photographs of the piers under pressure the first tendency to separation showed, not in the joints, but in cracks in the centre of some of the bricks. As Professor Unwin remarked, there are evidently great tension strains brought on the centre bricks of the pier under pressure; the sides tend to bulge, and draw the inner bricks apart. On the other hand, it is instructive to note that a certain proportion of the failures commenced on the vertical line of joints of the closers, a fact which seems to raise the question whether we have got at the best form of bonding for piers to resist heavy pressures. Professor Unwin's experiments also bring out the important fact that half-bricks crush at a lower pressure than the same bricks when tested whole. The difference is greatest in the London stocks, where the strength of the half-brick against crushing pressure was almost exactly half that of the whole brick (in tons per square foot). In the gault bricks the difference is very much less. Professor Unwin (and some other engineers we find concur with him) considers that this is due entirely to the proportion of height to width, which is greater in the half-brick, and leaves more facility for the shredding away of the outer portions under vertical pressure; as it was put to us by an engineer at the meeting, if the half-brick were again divided horizontally, so as to return to the flatter proportion, the crushing weight would rise to the same proportion as in the whole brick. We quite agree that this would be the case with a brick originally made of that size and shape but we cannot think that this is all, or why should the proportionate result of the whole and half-brick tests be so different with two different classes of brick? It must depend to some extent on the close and homogeneous character of the brick; and we should conclude that in the London stock there is a certain degree of cohesive strength in the outside skin which tends to aid the brick in resistance to crushing, and of which it is deprived when cut in half and the raw centre exposed as one of the sides of the cube. The conclusion is that the better and stronger the brick in itself, the higher will be the proportionate strength of the half-brick; that it may be safe to insert half-bricks, in a pier for heavy pressures, with one class of brick, though not with another.

It was remarked with truth by one speaker at the meeting, that the practical interest of the tests lay much more in the register of the first failures than in the register of the final collapse. The latter is of interest as giving information in regard to the direction in which the strains act, but in actual building we never think of proceeding so far as to crush a pier; we want to know up to what point it will be secure against the slightest failure.

We regret to learn that the Committee, which has been doing such careful and valuable work in preparation for its statement of results to the Institute, has been annoyed by premature and unauthorised publication of its results in some quarters. That this kind of thing was going on we were ourselves made aware nearly two months ago, by the receipt of a communication from some person who, like Major Pendennis's valet, professed to be "in possession of certing infamation" as to the proceedings of the Committee, which he proposed to sell to us. Finding, on communication with the Institute, that this proposed publication was not only unauthorised but would be much against their wish, we declined to have anything to say to our correspondent, the modern system of obtaining what is called "early information" by the medium of the back stairs being one which does not commend itself to us, nor, we imagine, to the class of readers whom we wish to address. A society like the Institute, carrying out its own series of experiments, is entitled to choose its own time and method of publication.

LOCAL AUTHORITIES AND NEW BUILDINGS IN RURAL DISTRICTS.

A NATURAL uncertainty appears to exist among some persons as to restrictions on or regulations in regard to building in rural districts. In urban areas the Local Authority has a general authority in regard to the line of streets and so forth. What, then, we have been asked by correspondents, are the rights and duties of a Local Authority in rural districts? The confusion on this subject arises partly from the fact that the Public Health Act, 1875, which is the general code of sanitary law, mixes up enactments which deal with urban and rural districts. The regulations for urban districts are more numerous than those for rural districts: hence the search for the latter is somewhat after the fashion of that for the proverbial needle in the proverbial bundle of hay. Moreover, Local Authorities do not generally help the ordinary individual. It would be quite easy for a Rural Local Authority to issue handbooks of such parts of the Public Health Act as apply to country places with by-laws and explanations, and to have notices in regard to them published in the local papers. But the country builder, seldom a person who knows much about Acts of Parliament, is left without any guide, and it must be added that the Local Authority is usually by no means anxious to carry out energetically any supervision in regard to new buildings.

This supervision is simply and solely for sanitary purposes—the Rural Local Authority is concerned with these alone. This jurisdiction is conferred on the Authority by some sections of the Public Health Act, 1875. The most important section is the thirty-fifth, which, being short, we may quote *in extenso*:—"It shall not be lawful newly to erect any house, or to rebuild any house

pulled down, or below the ground-floor, without a sufficient water-closet, earth-closet, or privy and an ashpit furnished with proper doors and coverings." Then follows a penalty clause. The fortieth section of the same Act is likewise short, and runs as follows:—"Every Local Authority shall provide that all drains, water-closets, earth-closets, privies, ashpits, and cesspools within their district *be constructed* and kept so as not to be a nuisance or injurious to health." These sections (the italics in which are ours) should be read with an earlier one, the twenty-third, which enacts that "Where any house within the district of a Local Authority is without a drain sufficient for effectual drainage," the Local Authority may require the owner or occupier to make a covered drain or drains emptying into any sewer which belongs to the Local Authority; or if none such exists which is not more than 100 ft. from the house, then into a covered cesspool or other place. The Local Authority may also require the drain "to be of such material and size, and that it be laid at such level," as their Surveyor may think desirable.

An important point should be noticed in respect of the above-quoted sections; they are as applicable to the castle as to the cottage, though there is probably not an official of an ordinary Rural Sanitary Authority who is competent to form a judgment in regard to the best system of drainage for an ordinary dwelling house. Another point to be noted is that these clauses are general, and give a general authority; they are what lawyers term empowering clauses; they do not enter into details. For this latter purpose many Rural Authorities issue by-laws which, under Section 184 of the Public Health Act, must be confirmed by the Local Government Board before they can have any force or effect. By the following section these by-laws shall be printed and hung up in the office of the Local Authority, and any rate-payer is entitled, on applying for a copy, to be supplied with it.

Theoretically, therefore, there exists full jurisdiction in the Local Authority to prevent houses and cottages from being built without proper sanitary appliances. It is very well known, however, that Local Authorities in rural districts are very lax in preventing sanitary defects in existing buildings. The Inspector of Nuisances too often does his duty in a most inefficient manner. Instead of going about taking note of sanitary defects, he does not move until some complaint is made to the Local Authority. If, therefore, this laxity prevails in regard to existing buildings, it is not surprising that Rural Local Authorities do little towards carrying into practical effect the powers with which they are intrusted in regard to new buildings, and that the good or bad state of the building depends largely on the character and views of the owner. The latter again in a rural district, however well intentioned, must often be necessarily in the dark as to the sanitary regulations, if any, of the Rural Authority. Their office may be a long way off; the owner has never heard of the particular sections of the Public Health Act; he may be a small capitalist or builder who is about to erect two other cottages, and has but very imperfect ideas as to sanitation. Theoretically, every person who is about to erect a building in a rural district should make himself acquainted with any by-laws issued by the Local Authority, and every inspector should examine the plans of a new building in order to see that the sanitation is up to the mark. Parliament has done nearly all that lies in its power to cause the sanitation of rural dwellings to be satisfactory. The Local Government Board cannot supervise a vast amount of details; as it is, it does not a little in this respect. It rests with the Local Authorities to exercise efficiently the jurisdiction with which they are invested. The conscientious and capable owner and builder will not need this supervision. Unfortunately there are some owners and builders who are ignorant or careless, but who are practically allowed by the Local Authority to build as they like. The state of this matter shows clearly how powerless the Legislature is to carry into effect theories, however desirable. There are many persons at the present time who seem to think every defect can be remedied by an Act of Parliament. Members of the Legislature are largely to blame for this false impression. They tell their constituents, or those whom they hope will be their constituents, that this or that should be done in forthcoming sessions, so that in an election speech everything seems possible to the best of all possible Parliaments. If a statute could do it sanitation would be perfect in our rural districts. We all know in what state it really is.

NOTES.

IN another column we give the description of the mosaic work recently executed at St. Paul's, by which the choir roof is now practically completed. As will be gathered from the description, there seems to have been a gradual tendency, as the work proceeded, to reduce the number and variety of the colours employed, and the work in the western domes is more sober in colour than in the first one executed. This is no disadvantage, nor will there be anything unsuitable in having a greater richness of colour in the eastern dome. But we fear we must say that the inspection of the new work confirms us in the idea we had already begun to entertain, that there has been an attempt at too much detail in these domes, which can never be distinguished from the floor of the church, while its existence gives a somewhat confused effect to the surfaces of the domes. It is urged that "to fill the saucer-shaped domes with subjects so clearly defined that they explain themselves without any effort on the part of the spectator, would have the effect of lessening the height of the roof." But this argument would apply equally to the supporting angels in the spandrels, which have in fact a very fine decorative effect. We feel convinced that a greater study of simplicity in the dome-designs would have produced a better result. The treatment of the wall-panels is admirable, and it will be a matter of great interest to see the total effect of the choir from below when all the scaffolding is removed. It is at all events a subject for congratulation that, after the many years of talk about the decoration of St. Paul's, a large proportion of it has actually been carried out, and in a shorter time from its commencemeut than any one probably expected.

THE interior of the National Portrait Gallery was open to inspection on Monday last to the representatives of the Press. Architecturally the building is very soberly treated internally, with no very special assumption of style; the principal openings are treated with round arches without imposts, and the design generally is in harmony with that of the exterior of the main block, in which, by a transition treatment at the end entrance block, the architect had cleverly escaped from the architectural control of the National Gallery façade. The windows are decorated with a little ornamental leaded work of effective design, and there are some good bits of wrought iron railing on the stair landings. With these exceptions everything is perfectly plain and unassuming, the pictures forming the attraction. The top galleries are of course well lighted, the others are so for the most part, the only exception being in the corridors along the centre of the large block, which are only lighted from the end; and some portraits hung in these corridors are certainly not well seen. The portraits are for the most part grouped in regard to class and date, though this is not always consistently carried out; for instance, we find Panizzi among the poets. Some of the portraits seem to have been hung with a special view to contrasts, moral or artistic; the vulgar figure of Theodore Hook, for instance, is seen next to the spiritual countenance of F. D. Maurice; Carlyle looks disdainful of the immediate neighbourhood of Lord Lytton; and beneath Mr. Lehmann's portrait of Robert Browning as he really looked hangs the poet's portrait as Mr. G. F. Watts thought he ought to look; a fine head, but not in the least like Browning: an object-lesson as to the motives of portrait-painting. The gallery is likely to prove a most attractive and useful addition to our permanent exhibitions; the only question is whether sufficient space is provided for future additions to the collection.

THE nave vault of Winchester Cathedral, the special character of which as a late form of vault with an unusually rich development of lierne ribs, gives it a peculiar interest, has been, as the Dean and Chapter were anxiously aware, in an unsatisfactory state for some time. It has recently been examined by Mr. Wolfe Barry, the well-known engineer, and Mr. Arthur Barry, who pronounce that the work of reparation should be undertaken as soon as possible. Owing to the decay and subsidence of the ancient timbers of the wooden roof, some of them of the Norman period, the lead, the walls, and the crown of the vaulting are subjected to a severe pressure and strain which might become a source of serious danger. Mr. Thompson, the contractor who carried out the work at Peterborough Cathedral, has been engaged to execute the necessary repairs at Winchester, which will be commenced at once, and are expected to take a year and a half. A liberal response has been made to the personal applications of the Dean for contributions towards the cost, which is estimated at 7,000*l.* The Earl of Northbrook, Lord Lieutenant of the county, contributes 1,000*l.*, and the Dean and Chapter another 1,000*l.*

THE Hellenic Society held an extra meeting on Monday last, to hear a paper by Mr. G. B. Grundy on the result of his survey of the Bay of Navarino and the island which nearly shuts it in (which is generally held to be the ancient Sphacteria), as bearing on Thucidydes' description of the contest between the Athenians and the Spartans in the bay and on the island of Sphacteria. The subject was rather historical and topographical than archæological in the usual sense of the word, and hence it is not properly within our province, though Mr. Grundy's paper was a very interesting one. His main point was that the southern opening to the bay, said to have been closed by the Athenian ships, was not the present entrance of the bay of Navarino (which he regarded as too wide for such an operation), but that of the inner lagoon, now separated from the bay proper by a low sand-bank, but which he suggested was then accessible by a narrow channel, such as a few ships could have easily blocked. We cannot go into the point here, beyond saying that Mr. Grundy's arguments did not convince us; but his survey of the site, of which copies were handed round, is a very good piece of work. The ordinary meeting of the Society announced for April 13 is postponed to April 27.

THE report by Dr. Bruce Low to the Local Government Board on the pollution of the River Dee and its tributaries by sewage and other impurities reveals a most serious state of things. The whole way from Bala lake to the estuary of the Dee there seems to be constant recurrence of pollution. The lake itself receives some sewage, and into the Dee is poured the raw sewage of the houses of Bala, Corwen, and Llangollen. Many villages are situated on the banks of streams, tributary to the Dee, which are made to act as sewers. As the report passes from district to district down the banks of the Dee the tale seems everywhere the same. At Llangollen the Dee appears to receive all the solid and liquid refuse of the town. At Oswestry privies have "shoots" directly into the river. At Overton the sewage passes from the settling tanks to the Dee in a little purified state. So we go on through a whole list of smaller places. And below all this the Chester Waterworks Company draws its supplies from the Dee, a mile and a half above the Chester weir. Chester is also subject to the effects of whatever pollution enters the Dee below the weir, as at high tides the water rises above it and brings everything with it that there is to bring. No wonder that complaints have been made about the quality of the Chester water supply, and that one witness averred that he could tell when the high tides were flowing by the taste of the drinking water. The Dee seems to have been worse neglected and mis-used than most of our large rivers (which is saying much); and it is evidently time that some strong measures should be taken to compel an improvement on the present state of things.

THE recently-reported case of Morley *v.* Leacroft, which came before the Chancellor of the Diocese of Southwell in the Consistory Court of this diocese, may be useful as a reminder to lay rectors of their duty in regard to the repair of churches. The ecclesiastical law is perfectly clear—a layman may be rector of a parish church, and in the absence of proof that by custom or special statutory provision the duty to repair is to fall upon the parishioners, the right to be rector and the enjoyment of the profits and tithes of the rectory carries with it the duty to repair the chancel of the parish church. In the case under notice the repair of the chancel of St. Peter's, Derby, came under discussion. Practically the case was undefended, and the Chancellor made an order that Mr. Leacroft should repair the chancel and pay the costs of the suit. The litigation illustrates the obligation under which lay rectors are in regard to churches, and may help to prevent other churches than that of St. Peter's, Derby, falling into a bad state. In the course of his judgment the Chancellor stated that suits of the description before him were rare. We hope this is because lay rectors are mindful of their duties in regard to churches, not because churchwardens fail to keep them up to the mark.

THE new electric wiring rules issued by the St. Pancras Vestry deserve careful study by all those interested in the future of electric lighting, as they are the first rules issued to guard against the danger from fire and shock on a 220 volt service. There are forty-eight of them, but we think the chief engineer has erred on the side of brevity, for he has failed to point out the importance of keeping switches well away from water-pipes, &c. A much nastier shock, and a much fiercer 'short,' can be got between a metal pillar and a switch than between switches of opposite polarity. The Vestry's inspectors may require contractors to open any joint, or to remove any casing, wires, or fittings for the purpose of ascertaining if the work has been properly done. This is rather hard on the contractor; the vestry should provide their inspectors with a small induction coil, a Crooke's tube, and a fluorescent screen, then they would be able to detect bad workmanship without the necessity of such drastic measures. As we anticipated, larger fuse-blocks are insisted on, and double pole cut-outs are absolutely prohibited. The consumer's convenience is altogether a secondary consideration. The advantage of a 220-volt service to him is the probability that the meter does not register when only one lamp is on; the disadvantages are the increased cost of wiring and fitting, uglier cut-outs, more expensive lamps, and more trouble by inspectors.

WE understand that a hotel is to be built on the north side of Leicester-square, a purchase having been effected of the property now lying between the Empire Theatre and Leicester-street, and having a return along the west side of the latter. This is the site of Leicester House, erected for Robert Sidney, second Earl of Leicester, upon a piece of lammas-land which adjoined the Military Yard of Henry Prince of Wales — afterwards used for Major Foubert's riding academy. In Newcourt's map, engraved by Faithorne in 1658, Leicester House appears as standing in open ground, nor was Leicester Field surrounded with houses until about fifteen years later. The house faced southwards, with a spacious carriage-yard in front; the south elevation showed two stories and an attic, with rows of nine windows. It could boast of many celebrated inhabitants, comprising the Princess Elizabeth, titular Queen of Bohemia; Colbert, ambassador from France; Anne, Countess of Sunderland; and the Prince Eugene. For many years it was occupied by George II., when Prince of Wales, and by his eldest son, Frederick. For the further accommodation of the latter was taken the adjoining Saville House, which had belonged to the Earls of Ailesbury, of whom Charles, succeeding as third earl in 1741, married the Lady Anne Saville, eldest daughter and co-heir of William, Marquess of Halifax. Leicester House was next taken by Sir Ashton Lever for his museum of curiosities which in 1788 Parkinson won in a lottery and transferred to Albion-place, at the south end of Blackfriars Bridge. It remained standing until about one hundred years ago; Lisle-street was laid out over the garden ground in 1791. Saville House, whilst occupied by Sir George Saville, Bart., was sacked, and its contents burnt by the "No Popery" rioters, 1780. Having been rehabilitated, the west portion was taken by a firm of linen-drapers; a fire that broke out in the then "El Dorado" music-hall, in 1865, gutted the east portion above the ground-level; on the site, cleared in 1879, was ultimately built the Empire Theatre, designed by T. Verity, and opened on April 17, 1884.

IN a letter printed in the *Athenæum* the Reverend Wm. Greswell appeals for a sum of about 250*l.*, wherewith to purchase the cottage in Nether Stowey, Somersetshire, at foot of the Quantock Hills, inhabited by Coleridge, which it is proposed to convert into a "Coleridge" library and institute for the village. Coleridge removed thither from Bristol in 1797, and stayed there three years, being in the immediate neighbourhood of his friend and benefactor Poole, as well as of Wordsworth and his sister at All-Foxden. It was in this Nether Stowey cottage that he wrote the "Ancient Mariner."

THE Exhibition of the Society of British Artists is a better one than the average, though there are not many works that can be said to rise above mediocrity. Among the most important figure subjects Mr. Hutchison's "Young Communicants" (9) would be a good picture but for its dingy quality of colour. Mr. Robert Morley's "His Comforters" (196) is one of the best works in the gallery, and shows not only feeling and expression but conscientious painting of all the accessories, in which respect it is rather exceptional in the collection. Mr. Warrener's "Summer" (214) is a clever study of nude figures in sunlight, though the warmth of colour is overdone. Among the landscapes Mr. de Bréanski's "A Royal Forest" (248) is a fine work, and Mr. Harcourt's "Dunglass" (131), another of the larger landscapes, is worth attention, as also Mr. Black's "Their Last Moorings" (65). Mr. Fuller's "Clear Shining after Rain" shows a fine sky effect, but the treatment of the foreground is conventional. Some of the smaller landscapes are the best; *e.g.* Mr. Frampton's "Evening in a Cornish Fishing Village" (34), Mr. Inskip's "A Weedy Corner on the Cliffs" (32), Mr.

Williams's "Market Boat, Venice" (191), Mr. Arthur Ryle's "Evening" and "Morning" (205, 220) and his "Old Stone Cross," a water-colour (425); and Mr. F. Dean's "Sun, Wind, and Rain" (241). Among sea-pieces Mr. Walters's "Off Margate" (45) is a not unpleasing return to the old Stanfield style of sea-piece; Mr. Ayerst Ingram's "When the Trade Winds Blow" (200) in more modern—very modern—style, is a fine little picture of a ship in full sail over a dark sea. There are a good many architectural subjects; the interiors by Mr. Wyke Bayliss seem to us, we must confess, the same thing always; Mr. Armstrong's "Tower of Temple Church, Bristol," (41) is a good architectural study, but, professing to be colour, is too much like a monochrome. Mr. Boot's "Limburg on the Lahn" (306) is a fine composition, with the abbey standing up on the hill in the centre; Mr. H. Stannard has made a good view of "Worcester" (333), and Mr. Ernest George exhibits an interesting little drawing of "Cremona" (297).

IN the gallery of the Théâtre d'Application" in Rue St. Lazare, Paris, there is an interesting exhibition of the designs of a young artist, M. Albert Guillaume, the son of the late eminent French architect of that name. They are crayon sketches of Parisian and military life and character, chiefly of a humorous description, and have succeeded at all events in interesting the Paris public. It may be mentioned also that an exhibition of electrical work has just been opened at the Georges Petit Gallery.

AMONG smaller exhibitions that at Mr. Maclean's Gallery in the Haymarket contains an interesting picture by Mr. Orchardson, which was formerly at the Royal Academy, "Music, when sweet voices die" &c.; a lady in the dress of the early part of the century seated at a grandly designed old harp-shaped piano, which forms the salient object in the picture; some of our readers will probably remember the work. The exhibition includes a fine study of two girls by Mr. Van Haauen, which perhaps would have been as valuable if painted half the scale. Harlamoff's "The Strolling Player" is a tenderly-painted head; and there are some good examples of Clays, and a picture (an early one?) by Mr. H. W. B. Davis, "Collecting the Flock." At Mr. Tooth's Gallery adjoining are to be seen, under the rather fanciful titles, "Rose," "Shamrock," and "Thistle," three of the best dog pictures we have seen for some time.

DR. WALDSTEIN writes to the *Times* from Athens expressing great satisfaction at the restoration of the Stadium, which has been prepared for the revived Olympic games. All the abundant traces, he says, of the ancient structure have been conscientiously followed, so that it forms a unique instance of such an archæological experiment on an enormous scale. Whether we can partake Dr. Waldstein's enthusiasm as to "seeing the athletic life of our own times in such a setting and among such associations" is another question. There is surely an incongruity of association about it that one can hardly escape from.

"A LOST LEADER."

BY MR. E. INGRESS BELL.

IT has been heard with general regret that Mr. Norman Shaw has retired from the active pursuit of his profession. If so, there is an end to that long series of works which, for the past quarter of a century, have delighted and astonished his fellow-labourers in the architectural field, when each recurring spring brought the question—What has Shaw got in the Academy? Never, perhaps, has such a superb legacy of architectural achievement been left by any one man. John Thorpe's name rises at once to our lips. But his works were far fewer in number, less varied in their object and use, and quite without that amazing versatility which is the distinguishing note of Mr. Norman Shaw's buildings.

An architect of Mr. Shaw's special gifts and accomplishments could not have appeared at a more opportune moment. One by one our great historic mansions and homely manor houses, bequeathed to us by the sixteenth and seventeenth centuries, are succumbing to age, neglect, and fire. Many have disappeared within living memory, and the years of the remainder are numbered. The architects of the early part of the century—notwithstanding their splendid enthusiasm and appreciation of ancient art—failed to catch its spirit. Their Elizabethan mansion was a hard and soulless thing, a mere "theatricality" as Carlyle would say, and the church architects never succeeded in adapting the traditional Gothic which they had so thoroughly learnt to the needs of English domestic life. But for Mr. Eden Nesfield, Mr. Shaw, and one or two fellow workers, the distinctive value and charm of our native domestic architecture would have become ere long but a memory.

But with the expiring influence of Pugin and Ruskin a new power was silently but surely making itself felt. Hitherto our teachers had been preachers. Pugin, indeed, wrote about art and practised also; but his trenchant pen did him the best service. Ruskin wrote, but wisely did not attempt to practise; alluring adherents and confounding opponents by the subtlety of his dialectics, and the witchery of his literary gifts. Mr. Norman Shaw, on the other hand, practiced art, but did not talk about it. He has consistently shunned the platform and has but seldom used the pen. He speaks to the world by the more enduring eloquence of his accomplished works.

The reasons and motives which determined and directed the course of his artistic career can only be inferred from a study of his buildings. There is extant a print of a design for a Town Hall in Mr. Shaw's earliest manner, which was uncompromisingly mediæval, but of short duration. Next came the little house at Bromley, which disclosed within very modest limits an extraordinary power of dealing with domestic plan. All Mr. Shaw's sympathies appear to have been originally on the side of the picturesque. Varied and well studied skylines; towering groups of chimney stacks, broken into facets and crowned with piquant cornices; everywhere an exuberance of detail, and a delight in quaintness and surprise. This feeling held sway over him during the period of his greatest activity, and found expression in Leyes Wood, Wispers, Cragside, and many others. It was sometimes objected by even his warmest admirers that his works lacked scale, that his mansions were but big cottages—beautiful cottages notwithstanding—and that size of building brought with it, indeed, increase of pleasure, but no corresponding dignity. But those who watched carefully saw a change coming over his works; his sense of enjoyment in the use of a multitude of telling features abated; a broader treatment supervened; and one by one the "fetching" details and peculiarities which had meanwhile been adopted by plagiarists were cast aside. A growing severity began to mark his work, running sometimes almost to baldness, but always found on closer study to have its special value as a preparation for, and a foil to, some delicious touch of delicate art. It was not without something like dismay that some of his followers saw the development of his maturer manner lead to such results as a notable house at Queen's Gate, and of all the little school which he gathered about him none have, it is believed, ventured as yet upon similar ground. It is in evidence that it is possible by assiduous study of the original to transplant many of the characteristics of his more ornate designs. Many have learnt the Ingle-nook dodge, and the multangular bay, the curvilinear lattice window, and suchlike, and have sprinkled them about their works with such adroitness that even the elect are in danger of being deceived. "Most can grow the flowers now, since all have got the seed." But to invest plain brick walls and square sash windows with interest, and convert by some magic touch what would otherwise be mere building into architecture: this is no mere trick to be caught by an apt imitator, but the incommunicable gift of the great artist.

The present writer has never wavered or faltered in his admiration for all the master's works. Their increasing simplicity has been recognised as increasing power, and the rightness and appropriateness of each and all to its special uses and surroundings has been taken for granted. But a little trial of faith was in store in the shape of "Chesters." Is this Mr. Shaw's last word on art? And, if so, is it a confession that all his earlier views were wrong—the aberrations of an immature judgment? Is all our sketching and questioning of mediæval and post-mediæval work to lead to this, which—plan apart—might have been the work of a mere Cubit? It is written in some of the artistic journals which deal with such matters that this last example of Mr. Shaw's skill is his crown and glory, the acme and consummation of an ever-victorious career. Then, if it be so, we feel like old Sol Gills, that the world has gone beyond us. There is no pleasure in comparing this design feature by feature—chimney-stack with chimney-stack—cornice with cornice—and window with window, with earlier works by the same hand; but if this latter method is the true and only genuinely artistic one, then we should like to know the reason why. Why it should be mentioned in the same day as "Dawpool," for example?

The writer is not likely to do Mr. Shaw the injustice of supposing that "Chesters" is without a complete defence; only ignorance and dulness prevent him from enjoying it.

And this consideration brings this rigmarole to a climax. It has been said above that Mr. Shaw seldom used the pen. On the rare occasions when he has done so it has been with marked effect, and all could see what a power was latent therein.

Is it too much to hope that in the long years of leisure, which all trust are in store for him, he will—his building being now done—set down in black and white, for the benefit of others, the views and lessons which he has gathered during his long years of experience and success, and the line of thought which has conducted him from his original manner to—something so very different.

E. I. B.

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS:

BRICKWORK TESTS.

The tenth ordinary meeting of the present session of this Institute was held on Monday last, at 9, Conduit-street, Mr. Alexander Graham (Vice-President), in the chair.

Mr. W. H. White (Secretary), announced the decease of M. Emile Bœswilwald, one of the Inspectors-General of Historical Monuments of France, elected Hon. Corresponding Member in 1879; also of Mr. George Richmond, R.A., an Hon. Associate since 1877.

The Chairman drew attention to the magnificent work of Signor Ferdinand Ongania on St. Mark's, Venice. This work was commenced about twenty years ago, and took Signor Ongania something like ten years to complete. For a long time the Council had been trying to procure this splendid work at a moderate price, and had lately obtained it. It was intended to bind the work, which would then be laid on the table for a month for the inspection of the members. Another work lately added to the library was a complete monograph of the "Exposition de Paris," of 1889. A vote of thanks was passed to Sir Polydore de Keyser for the latter work.

Papers were then read on "Brickwork Tests," by Messrs. William C. Street, Max Clarke, Matt. Garbutt, and Professor Unwin, F.R.S.

The proceedings opened with a report, prepared by Messrs. William C. Street and Max. Clarke, of the first series of experiments which had been undertaken by the Science Standing Committee for the purpose of ascertaining the amount of resistance possessed by brickwork under great crushing loads. The Committee had thought it desirable to institute these systematic experiments, as no reliable data existed on the subject, and textbooks and authorities differed widely. The scheme had been first submitted to the Committee by Mr. H. W. Burrows, and the details had been settled by a Sub-Committee con-

sisting of Messrs. Burrows, Faija, and Street. After Mr. Faija's death, Professor Unwin and Mr. Max. Clarke had joined the Sub-Committee. It had been decided to confine the experiments to London Stocks, Gault, Leicester red, and Staffordshire blue bricks; to build two piers of each kind 6 ft. high and 18 in. square, using for one lime mortar, and for the other cement; thirty-two piers to be erected altogether, one-half for crushing at the end of three months, and the other at the end of nine months. The report went on to state that the Committee's appeal for subscriptions to defray necessary expenses had been so poorly responded to, that the matter must have fallen through had not Sir William Arrol generously come forward and placed at their disposal a powerful hydraulic press, together with a massive testing machine expressly made for the Committee's purpose. The site of the works, kindly lent by the West India Dock Committee, consisted of a piece of ground in front of the Engineer's office at the docks, and close to the hydraulic engine-house, from which water at a pressure of 700 lb. to the square inch was available. The piers were commenced on July 24 and finished on August 13. They were built on a temporary line of rails about 140 ft. in length, and laid to a 16-in. gauge. Over the rails were first placed wrought-iron plates, 2 ft. by 2 ft. 6 in. by ½ in., 1 ft. apart, with two holes drilled in the end nearest the testing machine, by means of which the piers were drawn along the rails to the machine. The bricks, lime, sand, and Portland cement used were of the ordinary description, the Portland cement being kindly given by Messrs. J. Bazley White & Bros. The piers on one side of the machine were in Portland cement mortar, and on the other in grey lime mortar. The cement mortar was mixed by measure in the proportion of one of cement to four of washed river sand, and the lime mortar in the proportion of one of lime to two of sand. The brickwork started upon a bed of mortar the thickness of an ordinary joint, and rose about four courses to the foot. A perfect bond was not attempted, as it was thought best to keep to actual practice. Each pier had the joints struck with a weathered joint as the work proceeded, and was finished with a layer of mortar, upon which a sheet of felt was laid to prevent the top-courses deteriorating from heavy rain. Messrs. Max. Clarke, Hooper, and Street superintended the building of the piers, and a record of progress was kept, so that the age of each pier at the time of testing could be ascertained. Testing commenced on December 9, and was completed on the 31st. The report went on to describe the crushings, and concluded with a series of tables giving full details of the results arrived at. The Committee considered that though in some cases the results had been unsatisfactory, much new information had been gained which might be of great advantage to the profession. Six fresh piers to replace faulty ones had been built, and would be crushed at the end of four months, in order to give a complete estimate of the respective strengths for that period. The most important tests would be those at the end of ten months, as these would give the strength of brickwork when the mortar had matured.

A number of photographs of the piers taken at intervals during the crushing process were here shown by means of the lantern, and explained by Mr. Max. Clarke.

Mr. Matt. Garbutt followed with some notes on the behaviour, while under compression, of each of the piers experimented upon, and describing a series of diagrams he had prepared, illustrating the way the piers had collapsed. The vertical line of joints formed by the closers proved a plane of weakness in all the experiments, and it was generally at this line that the serious cracks first showed themselves. Pier No. 3, of gault bricks in mortar, was fairly typical of the rest. It bulged evenly and on all sides at once, nearly every brick in the body of the pier was broken, and the two pyramids at top and bottom remaining after the crushing of the mass were regularly defined, and approximately concentric with the axis of the pier.

Professor Unwin, F.R.S., in his paper, gave a series of reports giving the results (full details of which are printed in tabular form in the Institute "Journal") of his tests of the materials of which the experimental piers were constructed. Taking four samples of each of the varieties of bricks used, he found the mean crushing strength of the London stocks to be 84·27 tons per square foot, gault 182·2, Leicester red (half-brick) 382·1, and Blue Stafford (half-brick) 701·1 tons per square foot. Some of the bricks had to be cut in half, as they were too strong to be crushed in the 100-ton testing machine. Two specimens of Stafford blue half-bricks stood even this test, and could not be crushed with 100 tons. Half-bricks were found to be markedly weaker than whole bricks, and might be expected to crush with about 25 per cent. less pressure than the same bricks tested as whole bricks. For gauging the relative strengths of lime and cement, several specimens of briquettes were made and crushed, a few being reserved for testing at later dates. The tests gave mean results as follows:—Strength of lime briquettes (2 parts sand to 1 of lime by volume) at 4 weeks, 6·08 tons per square foot; at 12 weeks, 8·73 tons; at 24 weeks, 15·72 tons per square foot. Cement briquettes (4 parts sand to 1 of cement by volume):—Strength at 4 weeks, 31·45 tons per square foot; at 13·7 weeks, 48·52 tons; at 24 weeks, 56·15 tons per square foot. The Professor concluded with a description of the method adopted for determining the loads corresponding to the gauge pressures for the large hydraulic press.

Professor Unwin added that the limits of working stress presented were somewhat as follows:—For bricks in lime mortar, not more than from two to four tons per square foot; for bricks in cement mortar, not more than from four to seven tons per square foot; and for specially selected hard bricks, with cement mortar, from seven to eight tons per square foot. Obviously then it could be seen that the ratio of the working stress to the probable breaking strength of the brickwork was a very small one, much smaller than in most structures with which an engineer had to do. An iron or steel bridge was loaded up to about one-fourth or one-fifth of its probable breaking weight, and a boiler to one-sixth or one-seventh of the load it would burst at. The factor between the working load and the breaking strength in brickwork must be more like twenty to one, which was a very large factor. No doubt the reason was partly that the brickwork was not a homogeneous structure, and allowance had to be made for the weakness at the joints, but he imagined the large factor between working and breaking stress was to a great extent an expression of their ignorance of the real strength of brickwork. It was to supply in some measure data as to the real strength of brickwork that this series of experiments had been undertaken, and, when completed, they would afford the largest single amount of information on the subject. In the course of the experiments he had had to speak to various people about them, and he had been told that what was wanted was a ratio. If that was intended to mean that a little cement could be tested, and a certain brick could be tested, and the ratio found which would give the strength of any single part, then he was afraid they were a century off having the amount of knowledge which would give that result, and, in fact, he did not like the expression of a ratio. What the architect and engineer wanted was an absolute measure of the strength of the things they were building—to know the actual load the piers had put upon them. It was clear that with bricks of different strength they would get piers of different resistance when built. He did not think that the ratio between the strength of the brick and the pier would be a simple one, but there would be some relation between the strength of the bricks and the strength of the piers; therefore, one of the inquiries had been to make a series of tests of the bricks actually employed. It would be seen that the London stocks carried only about 84 tons per square foot, and the Staffordshire ones up to about 700 tons. He had only a testing-machine giving up to 100 tons, and in many of his tests in the case of the strongest he had only tested them as half bricks. The question arose whether there was any difference between the strength of a half brick and the strength of a whole brick per square foot. He had made some tests which tended to show that the half bricks were not so strong as the whole bricks per square foot. They had used a strong brick for the whole brick and a weak brick for the half brick, and the results were rather exaggerated, but in later tests he did not find so great a difference. No doubt in the average of cases a half brick did not give so much strength as a whole brick. That afforded some indication of what results might be expected in the case of piers. It was desirable also that something should be known about the mortar and cement used in the tests. As these were cases in which the cement and mortar were used in compression, he elected to test them in compression. The ordinary way to test cement was to make a small tension brick, and test it about the end of the week. This was a very valuable test if it was desired to know whether there was a certain standard quality of cement, but it was useless in considering structures such as these piers. With a sufficiency of skill, cement could be made to give a very high test at one week in the tension test. He did not trust to these tests as a matter of the strength of the cement, and he, therefore, elected to make tests in compression, and with the aid of briquettes made with a good and pure sand selected many years ago as a standard test. This standard sand gave the briquettes nearly double the strength of those made with the sand actually used, which had more or less of earthy matter with it. He believed he was somewhat responsible for the fact that the hydraulic press had been employed in these tests, and he had been able to determine the pressure of the loads with an accuracy of something under 1 per cent. It was his business to know something about testing, and he believed he was acquainted with the published results of the testing of brickwork. The earliest tests were made during the building of the Menai and Conway bridges. They then used some 10-in. cubes of brickwork in cement—no doubt Roman cement—but they forgot to give the age of the bricks, and they turned 23½ tons to the square foot. Some valuable tests had been made with cubes of brickwork, but there were no tests of actual structures of brickwork comparable to those which had been undertaken by the Committee, except some carried out in America, and he had prepared an abstract of these to compare with the present tests. The American tests gave rather different results as compared with what had now been done. That was due to two causes. In the first place, the Americans used very strong bricks; and, in the second place, their piers tested were in the case of two of them fourteen months old, and in the case of another two twenty-four months old. Referring to the manner in which the piers gave way, Prof. Unwin said that there was no such thing as crushing. The piers had given way by shearing or by tension, and the views exhibited had shown clearly the two kinds of fracture which occurred in such structures. When a vertical load was laid on these pillars, there was a crushing stress in all transverse sections, but there was also a simultaneous shearing stress. If the structure was one which had special vertical planes of weakness, like joints, then the crushing loads developed vertical fissures, due to the tension acting horizontally. Should the pier not give way by these, it gave way along planes inclined 45 deg. to the axis by shearing. When they came to test the piers which were older, he believed they would have more complete examples of the shearing, and fewer of the tearing by lateral tension.

Mr. Donaldson, Engineer to the West India Docks Company, considered the papers most interesting and instructive. Professor Unwin said that in testing his cement he did not consider it necessary to test for tension, but that he simply tested for compression. It appeared to him, however, that tension was very necessary in arriving at some data of the material used in the construction of the piers. He considered they owed a great debt of gratitude to the Committee for standing out the experiments in the face of the extremely cold weather prevailing at the time. He had been much struck by the enormous difference existing between the crushing strengths of, say, Leicester reds, with the brick itself, and the result shown when the bricks were set in the form of a pier. He believed the highest of the Leicester reds was about 67 tons, and it finally failed by suddenly bending. That seemed to point to the tensional strength of the cement or lime being taken into account, as well as the crushing strain.

Mr. Gordon Smith considered they owed a deep debt of gratitude to Prof. Unwin for the valuable aid he had afforded, as well at to those gentlemen who had spent so much time in the conduct of the experiments. He would like to remind the members that this was only the beginning of the series of experiments, and he would attach more importance to them when the piers had an age of nine or ten months. He only hoped that a little more money would be subscribed to aid in carrying them on. Their thanks ought to include Sir William Arrol, for lending his powerful testing machine, and Mr. Donaldson, for permitting the experiments to be carried out at the London Docks.

Mr. John Slater thought their thanks were due to the Committee for their efforts in connexion with the experiments. They had always been

under the belief that about two to four tons was a stiff load on brickwork, and he thought that some element of error had crept into the general table of results. It was a most extraordinary thing that the final failure of the gault brick piers in mortar was higher than those in cement, for in nearly every case piers in cement carried a much greater load than those in mortar. Perhaps the gault piers had some bricks in the interior which were not of the same quality, but it would be well not to publish these results until they had an opportunity of re-testing the piers in cement, and especially at the end of a longer period, because both cement and mortar increased in strength with age. Professor Unwin had remarked that a half brick would not carry per inch or foot super so much as a whole brick, because the crushing pressure diminished as the ratio of the height to the horizontal dimensions increased. That had a more general practical bearing than seemed to be implied, and he would suggest that an exceedingly interesting series of experiments might be made by Professor Unwin if he would take a square piece of stone, 2 in. thick, and another of exactly the same area but 4 in. thick, and try the effect of his 100-ton machine upon them. He had much pleasure in seconding the vote of thanks, including the committee.

Mr. W. Emerson (hon. sec.) asked whether the weights placed on these piers suddenly by the hydraulic press would not give an entirely different result to what would be the case if the heavy loading came gradually on?

Mr. Bernard Dicksee said that the very weakest form of brickwork had been employed in connexion with these experiments, and Mr. Max Clarke had suggested that they should experiment on a length of wall wherein closers were not formed. The Committee had received valuable assistance from Mr. Dibden, the chemist of the County Council, who, at Mr. Blashill's request, prepared a careful analysis of the mortar used, and it would be only polite to include that gentleman in the vote of thanks.

Professor Aitchison remarked that, in his early life, he had had experience of heavy buildings in which the strength of the brickwork was an important factor, and he found that many of the brick piers failed. How long it took to thoroughly set the mortar in the centre of a pier of 18 in. or larger he did not know, but evidently it must take a considerable number of years. Most of the failures he had met with had been in piers built but a short time. It was therefore important to have some approximate idea of what the ultimate strength of a pier would be when it got to its average amount of resisting power, and what it was when soft, except the outside. He had a large quantity of brick set in mortar and cement, 9 in. square, without cross joints, and left for many years. He found that when set in good mortar the piers bore an average pressure of about 17 tons before showing signs of distress.

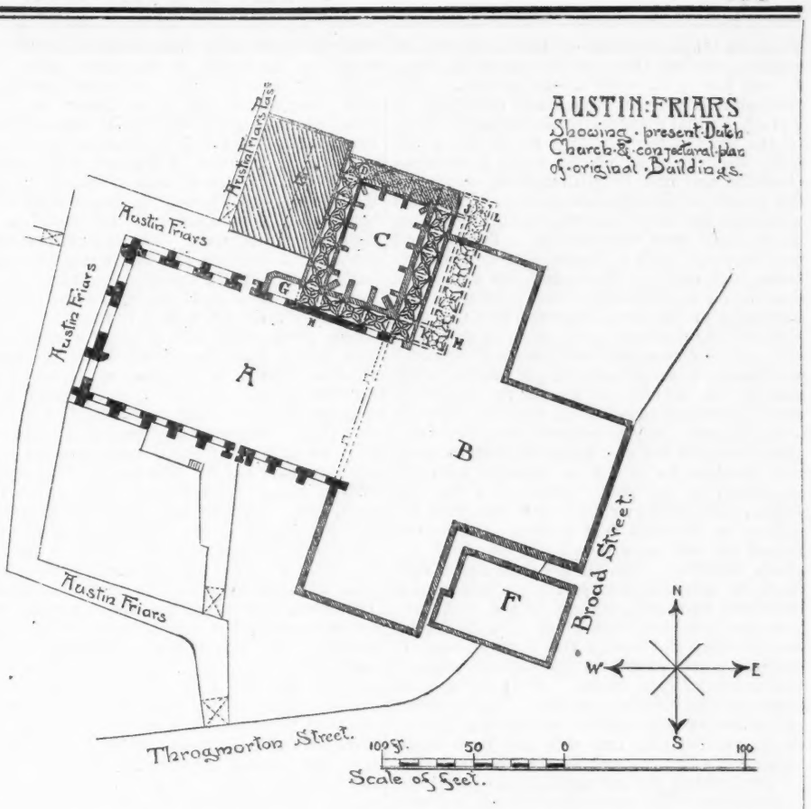
Mr. F. Walker (clerk of works) thought that the fracture in the line of closer suggested another method of bonding. When in the United States he had noticed that the brickwork there was very different to what it was in this country. It was only in engineering works that the Americans adopted the old English bond, generally using a 4½ bond, with heading course running through in the third or fifth course, and he had known them run as many as eight stretching courses to one heading course. In England the fracture was always in a transverse direction where they got the most joints. He would suggest to the gentlemen making these experiments that they should run in two courses in the piers, 4½ bond, and every fifth course a header. The Dutch bond did away with closers. The American bricks were better and much harder than English bricks.

The Chairman said that this was one of the happy instances when architects, engineers, and distinguished scientists, like Professor Unwin, were able to co-operate for the common good. Architects were indebted to engineers for the valuable formulæ giving the strength of wrought-iron girders, &c., while in the case of these experiments the architects were going to instruct the engineers in the testing of brickwork. He believed in the course of time they would have a very valuable text-book on the subject.

The vote of thanks was then put, and carried by acclamation.

The Chairman announced that the next meeting would be held on Monday, April 20, when papers under the management of the Art Standing Committee would be read by Mr. Halsey Ricardo, architect, and Mr. Christopher Whall, painter, on "The Architect's Use of Colour."

The proceedings then terminated.



A—Present Dutch Church (the Nave of the original building).
B—Site of the Choir and Transepts.
C—Conjectural Site of the Cloister.
D—Site of the archway recently demolished.
E and G—Sites of the buildings lately taken down.
F—Old Site of St. Peter-le-Poor.
H—Site of the impost discovered in the wall of the church.
J K—Eastern boundary of the present Austin Friars-square.
L M—Conjectural eastern wall of the Cloister.

AUSTIN FRIARS AND ITS CLOISTER:

A SUPPOSED DISCOVERY.

By Allen S. Walker.

The recent demolition of a very early eighteenth-century house in Austin Friars-square, City, has led to discoveries which have thrown some light upon the original buildings of the great Augustinian Priory formerly situated at that spot. In particular a theory—not improbable as I think—regarding the position of the priory cloister may now be advanced upon grounds which are no longer composed of mere guesswork.

Before entering further into the matter, however, it will be well to note the history of the Austin Friars' Church and Monastery. A brief summary will suffice.

The Mendicant Friars, otherwise called the Friar's Hermits of the Order of St. Augustine, and familiarly Austin Friars, came to England in the year 1251. In 1253 Humphrey de Bohun, Earl of Hereford and Essex, founded the Priory for them in London, and this was the head house of the order in England. In 1354 the whole church was rebuilt on an enlarged scale. According to the evidence of architecture the church was again rebuilt partially or wholly about 1475. In 1539 the house surrendered to Henry VIII., who granted portions of the property to Sir Thomas Wriothesley, Sir Richard Riche, and Sir William Powlett, afterwards Marquis of Winchester. Edward VI. in 1550 gave to the last-named the choir of the church, the transepts, and the chapels. In 1551 the same monarch granted the nave to the Dutch as a preaching-place under the name of "Jesus Temple." Powlett suffered his portion of the church to stand. The "great house," the cloister, and the gardens of the Priory, which also came to him, comprised an area of some 200 ft. from the church northwards to London-wall, by about 350 ft. from the western boundary to Broad-street on the east. Within this space he built a mansion known as Powlett's Inn, and afterwards as Winchester House; it was a great building, and the grounds were extensive. The Marquis's son despoiled the parts of the church belonging to him, selling the tombs, and stripping the lead from the roofs. The choir, transepts, chapels, and spire were all pulled down about 1612. It is not generally known that the exceedingly graceful spire was of timber, covered with lead. It appears to have stood over the juncture of choir, nave, and transepts. It had partly fallen down three years before its total destruction. When the chapter-house and the cloister were demolished is not chronicled. Houses have been built and rebuilt upon the sites of all that was destroyed. The nave remains as the church of the Dutch, retaining the late Decorated windows of the fourteenth century, and the arcades of the fifteenth. The wagon-roof, ascribed to the latter period, perished in the fire of 1862, after which the whole building was restored and refitted, under the direction of Mr. William Lightly.

So much for the history. Let us now view the site as it exists to-day. The passage leading to No. 57½, Old Broad-street, marks the north wall of the choir, which projected into the present road. Going southwards, we find the church of St. Peter-the-Poor, rebuilt in the last century. Part of it stands on the site of the Friars' choir, as does Crown-court. The old St. Peter's was situated in the angle between the choir and the south transept. Passing still south, we come to the Throgmorton-street entrance into the thoroughfare known as Austin Friars, which skirts the south, the west, and the north sides of the nave of the ancient church. The sites of the transepts, like those of the choir and chapels, are occupied by houses. The breadth of the nave is 83 ft., the length 153 ft. The choir with the transepts measured at least 140 ft., making the total length of the stately edifice about 293 ft. Upon the north side of the church were situated the conventual buildings: the chapter-house, the "great house," the cloister, the domestic offices, anp dwelling-houses of the Priory.

Austin Friars-square, where the recent excavation has taken place, is situated upon the north side of the church. Part of it occupies the site of the north transept, part of it is marked C in the accompanying plan. The buildings on the west side of the square extended from the wall at D to Austin Friars-passage. They dated from about the year 1704, and were demolished a month or two back. The house No. 10 contained a fine staircase with carved and twisted ballusters; the ceiling was painted on plaster after the manner of Thornhill. Both have been destroyed, but fortunately Mr. Philip Norman has made drawings; to him I am indebted for a description of them, and for some measurements of ancient masonry removed before I had examined it.

Embedded in the east wall of this house was an archway, marked D on the accompanying plan. It was just 9 ft. wide at the ground. Mr. Norman tells me that it measured from 12 ft. to 14 ft. high, that the measurement from the spring of the arch to the moulding at the crown was 5 ft., that the stone was an oolite in excellent condition, and that he attributed the erection to the middle of the fifteenth century. The shaft mouldings had a bold section, but the mouldings at the head were very shallow. The keystone was sculptured with a device of acorns and oak leaves, and received the intersection of a rib of vaulting on its west face. The mouldings were continued on the north, the west, and the south sides of the southern shaft, and on this same side part of an original low stone wall extended southwards towards and at right angles to the nave of the church. It formed the line of the east wall of the house and the west side of Austin Friars-square. Where the wall joined the base of the archway on the west face it had been cut away and moulded so as not to interfere with the mouldings of the shaft, which, at a few feet higher, stood entirely clear of the wall, after the manner of the shaft in a cloister. On the east face of the wall were remains of the plinth and plinth moulding. Behind the shaft and at right angles to this wall was part of a second wall stretching eastwards, its plinth and mouldings were complete on the south face. Parallel to this second wall, and behind the northern shaft of the arch, stood a third wall, apparently original, constructed of great stones. All three walls are shewn in solid black on the plan. The masonry at the back or east side of the arch was entirely rough, proving that that side had been incorporated in a building for the whole of its height. Of that building the two parallel walls mentioned formed a part. The west face of the arch had been plastered and painted; it was visible from the interior of the now demolished house; the back was to be seen from the porch of the house adjoining (No. 9). Near by were found remains of vaulting, including two large keystone bosses, receiving eight ribs each, and at least four smaller bosses, each receiving four ribs. The large stones are sculptured on the face, one with a head, probably that of the Virgin; the other with a naked female figure seated on what may be intended for a tree; I suggest Eve in the Garden of Eden as the subject. The surrounding ornament in both cases is composed of acorns and oak leaves. The smaller bosses are sculptured with a flower—perhaps a rose—in the centre. The base of a shaft, similar to those of the complete arch, was also found, together with portions of cinquefoil tracery. These remains indicate, as will have been seen, the existence of two bays of the building to which they belonged. An examination of the spot where the archway stood and a study of the history of the Austin Friars Priory, lead me to believe that this building was no other than the cloister.

In 1859 the Rev. Thomas Hugo described the arch in a paper read before the London and Middlesex Archæological Society. The idea of the cloister's having been situated at this spot suggested itself to him, but he had not the opportunities of examination which have been offered by the recent excavations, and he dismissed the theory as "necessarily a matter of merest conjecture." The Rev. W. J. Loftie informs me that although the cloisters at the Austin Canons' Priory at Holy Trinity, Aldgate, and at St. Bartholemew's, Smithfield, were on the south side, the cloister at Grey Friars was on the north. That at Blackfriars was on the south. Mr. Loftie is of opinion that cloisters were an afterthought with friars, whose domestic buildings, unlike those of an abbey, were usually poor—a fact which will appear of some importance further on. It is beyond dispute that the cloister at Austin Friars stood on the north side of the church, together with the other conventual buildings. The usual place for a cloister was between the nave and the transept of the church.

Admitting the probability of the theory that the cloister of Austin Friars stood at the spot marked C in the plan, it will be interesting to set down its conjectural dimensions.

From the north shaft of the arch at D to the wall of the church at H is a distance of 86 ft. At H has been discovered, attached to the wall of the church, a piece of another shaft, exactly in a line with the arch at D. The length of the cloister, then, would be 86 ft. The width of the arch at D, inclusive of the shafts, is 13 ft., which would be the width from north to south of the north walk or quadrant. The buildings which stood till recently against the church and continued eastwards from G nearly to the end of the nave, were also 13 ft. wide from north to south; this would be the width of the south walk. Undoubtedly these buildings succeeded conventual ones; they rose as high as the church itself, and occupied the length of three of its aisle windows. Westwards of the line D H there exists the chalk and stone foundation of another wall, running parallel to D H and at such a distance from it that the space thus formed measures, inclusive of both walls, 13 ft. again, and this would be the width of the west walk. The original portions of the walls of the north and west walks are at right angles to each other; the direction of the west and south walks are at right angles to each other; the outside width of each walk is 13 ft.—a coincidence which gives every indication of a cloister-like plan having been carried out here. Moreover, an exact square is provided at D, where the north-west corner bay stood, as evidenced by the remains of the vaulting on the west side of the arch there. About all this there is no conjecture; it is an account of actual measurements of the remains found *in situ*. The length of the cloister, viz., 86 ft., and the breadth of three walks, 13 ft. each, have therefore been found with certainty, and the length of the cloister garth is consequently determined at 60 ft., which is the exact length of the west side of Austin Friars-square. Now as to the conjectural breadth of the cloister. The north transept of the church appears, from evidence within the existing nave, to have stood parallel to the line D H at a distance of 39 ft. eastwards. It is possible that here, as at Westminster, the east walk of the cloister occupied the west aisle of the transept, and, supposing this walk to have been 13 ft. wide, like the other three walks, the extreme width of the cloister from east to west, allowing for the thick wall of the transept, would be 66 ft. Thus the total measurement would be 86 ft. from north to south by 66 ft. from east to west, for the outside of the cloister walls, and 60 ft. by 39 ft. for the cloister garth. These are the dimensions of the smaller cloister shown in the plan.

It is impossible, however, to overlook the fact that Austin Friars-square is not only 60 ft. from north to south at the west end, but is also 60 ft. from east to west, that is from the line D H to the line J K in the plan. This fact suggests that in some way or other the transept did not stand so far west as the plan shows, but bounded the square on the east side at J K. Adopting this possibility, and placing the cloister's east quadrant (13 ft. wide) within the transept as before, the cloisters would then measure a square of 86 ft. each way, and its garth a square of 60 ft. each way, which are the measurements of the larger cloister on the plan, where the line L M indicates the extreme extent eastwards. It is quite likely that the larger plan may be the more nearly correct one; there is so much in its favour, in spite of the difficulty offered by the supposed site of the transept, that I have thought it well to show it on the plan side by side with the smaller site. Of course, it is possible that the transept occupied the south-east corner of the cloister garth, and that it was a shallower transept than the general proportions of a church such as that at Austin Friars would lead one to suppose it to have been. Excavations at some future time may perhaps settle the point.

For the compilation of the plan I have had the advantage of using the maps, both ancient and modern, collected for the "New Survey of London."

It may be advanced that the conjectural plans show too small a cloister in either case. The chapter-house cloister at St. Paul's Cathedral was 100 ft. by 90 ft., that at Westminster Abbey is given at 141 ft. by 135 ft.; but against this must be set the fact, as Mr. Loftie has pointed out, that the domestic buildings of a friary were poor compared to those of an abbey. In this Austin Friars' cloister would be situated the library where sat and read the Augustinians who made the priory famous as a centre of intellectual, artistic, and pious effort. A Nuremburg counter of date *c.* 1450, picked up by a workman on the site, and now in my possession, points towards the probability that the priory had its school here, most likely in the west walk, beneath which the counter was found. Nine out of ten of these counters, as I am told on good authority at the British Museum, are found where conventual schools have existed.

At some distance below the surface of what is shown on the plan as the west quadrant of the cloister, I saw the workmen unearth several portions of human skeletons. From the positions of the shank bones it was evident that one at least of the bodies had been interred so as to lie east and west, a fact tending to show that the remains were those of a Christian. The cloister was used as the burial place for the brothers of a priory. In the long list of great and noble persons buried at Austin Friars, none are stated to be buried in the cloister, although two are given as interred in the chapter-house. It was in the cloister garth, however, that most of the conventual burials took place.

To sum up the case for the Austin Friars' cloister, here is a recapitulation of the leading facts:—It is known that the cloister was upon the north side of the church; it is to be inferred that it was a small cloister; its most probable position would be in the angle between the nave and the north transept of the church. In that angle there now exists an open square with the remains of an original conventual building, 13 ft. wide, on its north side; the foundation of a second original building, 13 ft. wide, on its west side; and houses, evidently succeeding conventual buildings, 13 ft. wide, on its south side. Original remains found at this spot indicate the existence of a cloister here; conjectural measurement based upon those remains, and the sites of present or past walls, appear to favour a theory making the cloister 86 ft. by 66 ft., but an alternative measurement, not without some probability, would give a square cloister of 86 ft. each way. While not wishing to press the point unduly, I think it may be asserted that the evidence of the masonry found, and the general features of Austin Friars-square and its neighbourhood, point to the probability that there have now been identified, the site, an archway, and certain carved stonework of the cloister attached to Austin Friars' Priory in the City of London.

A. S. W.

THE NEW MOSAICS AT ST. PAUL'S.

THE recently-completed, or nearly completed, portion of the mosaics in the choir of St. Paul's, was open to inspection by special invitation on Friday last week. The work in the choir is now virtually complete up to the western arch opening under the dome. The following description of the recently-executed work is reprinted from a paper drawn up by the Cathedral authorities:—

"The middle saucer-dome represents the creation of the fishes. The field is divided into eight sections by the spouting of eight wales. The heads of the whales are in accordance with Michelangelo's representation of a whale in the roof of the Sistine chapel. The inscription in the centre is *Creavit Deus cete grandia*, 'God created great whales' (Genesis i. 21). The rich blue of the waves, and the many-hued fish disporting themselves in the whirling waters, afford a very brilliant picture, the details of which it is not quite easy to follow. The open books in the great sculptured wreath round the saucer-dome carry words from the New Testament with special relation to fishes and fishing in their symbolical meaning:—*vado piscari*, 'I go a fishing' (John xxi. 3); (north), *mittite in dexteram*, 'cast the net on the right side' (John xxi. 6); (west) *bonos in vasa*, 'the good into vessels' (Mat. xiii. 48); (south) *centum quinquaginta iii*, 'an hundred and fifty and three' (John xxi. 11).

The westernmost of the three saucer-domes represents the creation of the beasts. The field is divided into eight sections by eight trees of the palm type, each affording resting-places for gaily plumaged birds. The inscription in the centre is *producat terra animam viventem*, 'let the earth bring forth the living creature' (Genesis i., 24). The animals represented in the several sections, beginning at the east and passing round by the north, are lions and foxes, hippotamus and elephant, deer, leopards and rhinocerus, sheep, deer, goats and bulls; lower on the ground are monkeys, rabbits, cats, squirrels, &c. The shields on the sculptured wreath round the saucer-dome carry the arms of four of the principal contributors among the City Companies towards the decorations, the Fishmongers (east), the Merchant Taylors (north), the Goldsmiths (west), and the Mercers (south).

Passing to the middle bay, the figure on the east side of the window is Alexander the Great, representing the secular arm which in God's providence brought the Eastern and the Western worlds of old into relations one with the other. The background above shows the peoples of the East and the West moving towards a meeting place. The figure on the west of the window is Cyrus, with reference to the opening chapter of the Book of Ezra. It is not necessary to call further attention to the splendour of the work; but it may be remembered once for all that the growth in splendour and strength as the chronological order of the work is

followed from the easternmost bay westward is very marked. It is the imperishable evidence of the rapid development of the new school of mosaic art founded by Mr. Richmond on the ancient ways. The antiphons to the Magnificat are continued under the windows throughout the clearstory. The inscription here is *O rex gentium et desideratus earum veni salva hominem*, 'O king of the nations, earnestly longed for, come save man.'

Passing to the western bay, still on the north side, the scene shown on the east side of the window is the appearance of the Lord to Abraham (Genesis xviii). The "three men" are prominent figures, and Sarah is seen in old age, looking out from her concealment through the door of the tent, unseen by Abraham (verse 10). The very striking group on the west of the window shows Job and his three friends. The inscription below the window is *O Adonai qui Moysi apparuisti veni ad redimendum nos*—"O Lord, who didst appear unto Moses, come to redeem us."

The figures in the spaces at the sides of the clearstory windows on the south represent the builders and decorators of the Temple and the Tabernacle, and the earliest visions of a house or tabernacle of God. . . . In the middle bay, the figure on the east is Aholiab, with the seven-branched candlesticks, and the woven hangings of the Tabernacle behind; and on the west is Bezaleel, engaged in metal working, with the construction of the pillars going on in the background. The inscription below the window is *O Emmanuel rex et lucifer noster veni ad salvandum nos*—"O Emmanuel, our king and morning star, come to save us."

Passing to the western bay, still on the south side, the figure on the east of the window is Moses receiving the Law; and on the west is Jacob's vision. The inscription below the window is:—*O Adonai et Dux domus Israel veni ad redimendum nos*—'O Lord and Leader of the house of Israel, come to redeem us.' . . .

Some idea of the scale of the areas covered will be given by the fact that each saucer-dome contains 532 square feet, and each pendentive of roof 140. The mosaic work in the choir and apse, when completed, will extend over an area of 8,300 square feet. Of this, about 6,750 ft. are already covered; the ten spandrels as yet not finished contains 1,550 ft. The number of glass tesseræ used up to the present time is about 6,750,000, and their weight considerably over ten tons. The mastic cement in which they are laid is a very careful composition, with ingredients which cause it to set like stone. It is made of the same red colour throughout, so that wherever it shows between the tesseræ—and that is very frequently, in the bold method used here—it produces one and the same effect. The weight of the cement used up to the present time is over twelve tons.

About 150 different tints of glass were in use for the tesseræ at Easter, 1894. The number at first was considerably larger than that; without counting the fact that one sheet of glass contained crackled gold, when cut up into pieces, gives tesseræ differing considerably from one another in tone. At Easter, 1896, the number of tints in general use is not more than about fifty."

Our own impression as to the result is briefly expressed in another column.

ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS.

A Midland Counties District Meeting of the Association of Municipal and County Engineers was held at King's Heath, near Birmingham, on the 28th ult. The attendance of members was a record for a district meeting, notwithstanding the somewhat inclement weather, which must be regarded as a great compliment to Mr. R. Godfrey, C.E., the engineer for the district. Mr. E. R. G. Escott, C.E., Halifax, presided, and amongst those present were Messrs. C. H. Lowe, Hampstead; G. R. W. Wheeler, Westminster; J. P. Norrington, Lambeth; J. N. Blair, St. Pancras; N. Scorgie, Rotherhithe; J. P. Barber, Islington; T. de C. Meade, Manchester; J. T. Eayrs, West Bromwich, J. Lobley, Hanley; A. Creer, York; A. T. Davis, Shrewsbury (district secretary) J. Hall, Cheltenham; Campbell, Canterbury; C. G. Lawson, Southgate; R. E. W. Berrington Wolverhampton; J. W. Bradley, Wolverhampton; F. S. Button, Burnley; H. J. Clarson, Tamworth; C. H. Cooper, Wimbledon; J. Gummage, Dudley; B. Godfrey, Droitwich; W. H. Hopkinson, Keighley; Richardson, Aston; Yabbicom, Bristol; J. S. Pickering, Nuneaton; S. Stead, Harrogate; J. Willmott, Willcox, Birmingham, and others.

Mr. Bayliss, Chairman of the King's Norton District Council, received the members and offered them a hearty welcome to the district.

The first business was the election of an honorary district secretary, Mr. Eayrs (West Bromwich) proposing the re-election of Mr. A. T. Davis, County Surveyor of Shropshire, which was unanimously agreed to.

Mr. Godfrey, engineer and surveyor, then read a paper on "Fourteen Years' Work in a Midland Suburb." The district within the jurisdiction of the Rural District Council of King's Norton, extended from the boundary of Birmingham on the north to Redditch on the south, a distance of 10¾ miles; and from Yardley on the east to Halesowen on the west, a distance of seven miles. In 1881 the population was 19,476; in 1891, 28,300; and in the present year it was estimated at 34,000—an increase of 74 per cent. in fifteen years, a rate of increase almost American in its rapidity. From its geographical position on the southern boundary of Birmingham, and being traversed by valleys all trending to the River Rea, which passed through Birmingham, and the subsoil being of a stiff retentive clay, the difficulties of sewerage which the Authority had to face were very great. The Authority commenced a system of sewers in 1878, which were only just completed when he was appointed in 1882. And since that time extensions had been constantly in progress to meet—and often to anticipate—the growing needs of the district. No less than thirty miles of sewers had been added since 1882. In order that the sewage from the drainage area should reach the outfalls of the Drainage Board, it was necessary that it should pass through the existing city sewers, and for that purpose provision was made in the order of 1877, whereby Birmingham was to receive a perpetual annuity "to be settled and secured by agreement on the basis of the population or the number of inhabited houses." Forty gallons per head per day being the maximum quantity. This payment was 2⅗d. per head of the population in the drainage area, but on the completion of the Cole Valley sewer it was raised to 5½d. per head per annum. Outside the drainage area there were several villages which had to be dealt with separately. Lifting had to be resorted to, and eventually Shone's ejectors were adopted. A central station was adopted at Lifford, from whence compressed air was sent 2,000 yards into the area termed the extension area. The sewage from there was propelled a height of 70 ft. to the top of the hill separating the two valleys, and from there it flowed by gravitation to the outfall into ejectors, which lifted it into the tanks. The plant provided consisted of two boilers, 20 ft. by 7 ft., fitted with Lea Houle & Co.'s forced draught, two Shone & Ault's horizontal engines and compressors. The sewage was received into an elevated carrier, and during its passage along this to the tanks it received the milk of lime and perchloride of iron, which became thoroughly incorporated with it before it entered the tanks. In the tanks, which were worked in pairs, it underwent a period of quiescence and deposited the heavy matter. The supernatant liquid was then drawn off and passed through the bacillite battery, which was the peculiar feature of the method of treatment adopted. The liquid was then subjected to the action of steam and carbolic acid gas, the steam being charged with a germicide composed largely of carbolic acid, the action of which, it was claimed, effectually destroyed the putrefactive organisms in the sewage, thereby preventing any secondary decomposition. After the liquid left the bacillite battery it was passed into two of Thwaite's filters, which were capable of passing 27,000 gallons of liquid per square yard per day. The filters were 8 ft. in diameter, and by reversing the flow of the liquid, were self-cleansing. From the filters the effluent passed direct into the river, and, as it was a very small one, most exceptional care had to be taken to prevent any cause of complaint. The City of Birmingham was on the watch, and, at all cost, pollution of the river and consequent litigation had to be avoided. Irrigation was not adopted owing to the unfavourable character of the subsoil, and, although fourteen acres had been purchased, only part was used for the buildings and some osier beds. He had designed the works, which had been carried out under the immediate supervision of the assistant-surveyor, Mr. J. H. Webb, whose valuable assistance was cordially acknowledged. In 1883 and 1884 an attempt was made in Parliament to sever the gas supply of the district for Birmingham, but the effort was not successful. At that time each public lamp cost 2*l.* 8s. 6d. per annum, including all repairs, lighting, &c. In 1885 the outside authorities were offered gas and street lighting at $\frac{12}{25}$ of the lowest current price per 1,000 cubic feet. At that time large consumers paid 2s. 1d. per 1,000, so the offer meant gas at 1s. per 1,000 cubic feet, provided the cost of lighting, maintenance, &c., was undertaken by the Local Authority. They at once closed with the offer and realised an immediate saving of 500*l.* per annum. The average cost now, including gas, was 32s. per lamp, so that with 1,050 lamps a saving of 866*l.* 5s. was effected. The incandescent system had been applied to seventy-six lamps. The difficulty of lighting from the outside of the lanterns and of protecting the mantles against the effect of the wind had been overcome by a device which was to be seen on the lamps in the High-street. On April 1 last, by the Parish Councils Act, all the roads in the district (except the main roads) were transferred to the Rural District Council. The total length was 129 miles. The Council was placed in such an exceptional position that they were making a strenuous effort to have the charge of the main roads in the district restored to them. Being so essentially urban, and bordering on the City of Birmingham, there was every reason to contend that with headquarters at Worcester, twenty miles away, the care of these roads would be better in the hands of a Local Authority than under a central organisation. In 1888 a hospital for infectious diseases was completed at West Heath. It was built to provide thirty-two adult beds, but as patients suffering from scarlet fever only were admitted, the majority of which were children, there was room for sixty. Plans had just been adopted for a house for the nursing staff, and instructions given for the preparation of plans for a smallpox pavilion. The cost up to date had been 9,950*l.*, including site. Smallpox cases were treated in a Doecker tent, which would be burnt as soon as the new pavilion was ready. The water supply of the hospital was from a well in the grounds 97 ft. deep, from which the water was raised by a Halliday windmill. On some occasions 700 galls. an hour had been raised. Birmingham had a monopoly of the water supply in the parishes of King's Norton and Northfield, but there were parts of the district which they were unable to supply, and it had devolved upon the Rural District Council to take action. A supply was obtained from the East Worcestershire Waterworks Company for Rednal and Ruliery on the South, and at Bartley Green a supply was being provided for the neighbourhood, containing about 1,600 persons. A well had been bored through the Bunter pebble beds to a depth of 280 ft., and a 20,000 gall. tank was being erected. Within the tower supporting the tank two Hornsby-Akroyd oil engines would be placed, and from the tank the whole of that part of the district would be supplied. There were two efficient fire brigades, one at King's Heath, and one at Selby Oak.

Mr. J. T. Eayrs (West Bromwich), said he had a considerable number of incandescent lamps at work, but was not at present prepared to give any statistical information as to the life of the mantles, which were the most serious part of an installation. Speaking generally as to the system, he thought it had a great future before it. He was now trying an experiment with lamps constructed to burn 2¼ ft., instead of 4½ ft. of gas per hour, and, so far as it had gone, with very good results.

Mr. C. H. Lowe (Hampstead) was of opinion that the mantles suffered seriously from vibration in the streets.

Mr. Wheeler said he tried the incandescent lamps in Westminster for four months, and found the vibration ruinous to the mantles. The destruction of mantles had doubled the cost of the burners in four months.

Mr. Scorgie said that his experience of the incandescent lamps in Rotherhithe, a district with heavy traffic, confirmed that of Mr. Wheeler in Westminster.

Mr. Pickering, Nuneaton, said he did not think the filters were capable of doing the work stated, and asked if actual working figures were given, or merely the figures of the patentee.

Mr. T. de Courcy Meade, Manchester, proposed a vote of thanks to Mr. Godfrey for his paper, and asked with regard to the bacillite system whether analysis had been taken of the sewage treated and the effluent and the quantity of chemicals applied.

Mr. Massie, Wakefield, seconded the vote of thanks, and wished to know if the Local Govern-

ment Board would sanction a loan for the building of a smallpox hospital on the same site as the other infectious hospital.

Mr. Yabbicom, Bristol, said he was in a position to inform Mr. Massie that the Local Government Board would not sanction a loan. Only that week he had an interview with Dr. Thorne Thorne and Mr. Smith, the Architect, and they expressed their intention not to allow loans to be granted for buildings in which smallpox and other infectious diseases were treated on the same site.

Mr. Willcox, Birmingham, said that when he saw the bacillite system in operation at Kettering, the carbonic acid gas was subjected to the crude sewage and not to the separated liquid. It was then claimed that one of the advantages of this system was the absence of smell from the sludge.

Mr. Nisbet Blair, St. Pancras, said that ten years ago the Local Government Board sanctioned loans for pavilions for treating typhoid, scarlet ever, and smallpox within the same enclosure.

The President asked, with reference to the use of Duckett's slop water-closet, whether there was any difficulty with the flow of sewage in times of frost and severe weather.

Mr. Eayrs, West Bromwich, said he had put up an iron building for the treatment of smallpox, for which they were paying out of the rates. That was the solution of the question.

The vote of thanks having been accorded,

Mr. Godfrey, in reply, said the figures given with respect to the filters were the makers' claim, and he had not sufficient stuff to test them to their full capacity. The sewage did not go through the filters; only the sterilised effluents. With regard to the chemicals, they put in 7 cwt. of lime and 5 cwt. of perchloride of iron. As to the smallpox hospital, they were in the same position as other authorities, and would have to erect a temporary building. Duckett's slop water-closet had been introduced since the great frost of last year. That frost compelled them to look for something different from the ordinary plumbers' water-closet.

The members having been entertained to luncheon by Mr. T. R. Bayliss, Chairman of the Council, visits were made to the residence of Mr. Joseph Chamberlain, M.P., where the orchid houses and grounds were inspected; to the generating station of the electric car system of the Birmingham Central Tramway Company; an inspection of Morrison's road scarifier; and to the sewage works at Lifford, where an opportunity was afforded of inspecting the bacillite system of sewage treatment. On their return to King's Heath the members were entertained to dinner at the Institute.

Illustrations.

ABBEY DORE.*

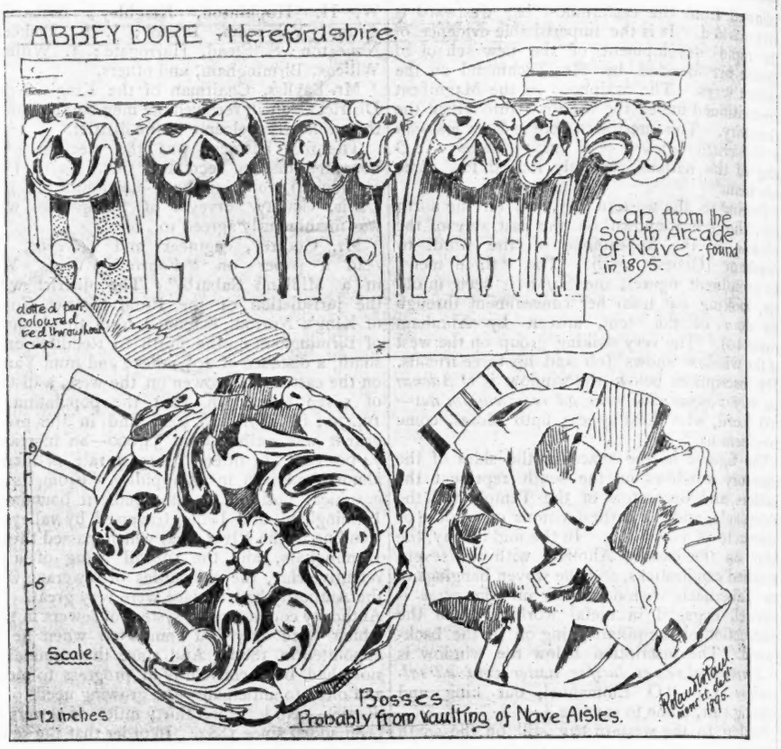
SEVERAL examples of Cistercian monasteries have already appeared in the series of Abbeys in this journal—Fountains, standing first by reason of its magnificence and extent; Rievaulx, noted for the beauty of its ruined church; and Netley, Kirkstall, and Furness for their conventual buildings. In the West of England and in South Wales is a remarkable series also—Tintern, Cleeve, Neath, Margam, and Dore. All are very beautifully situated in secluded valleys—a marked characteristic of the Order. Dore stands about midway between Hereford and Abergavenny, two miles from the southern end of the "Golden Valley" that runs from Pontrilas to Hay. It has always been known to architects and archæologists as a valuable and interesting example of ecclesiastical work, and within the last year or so additional interest has been given to the building by the excavations that have been carried out.

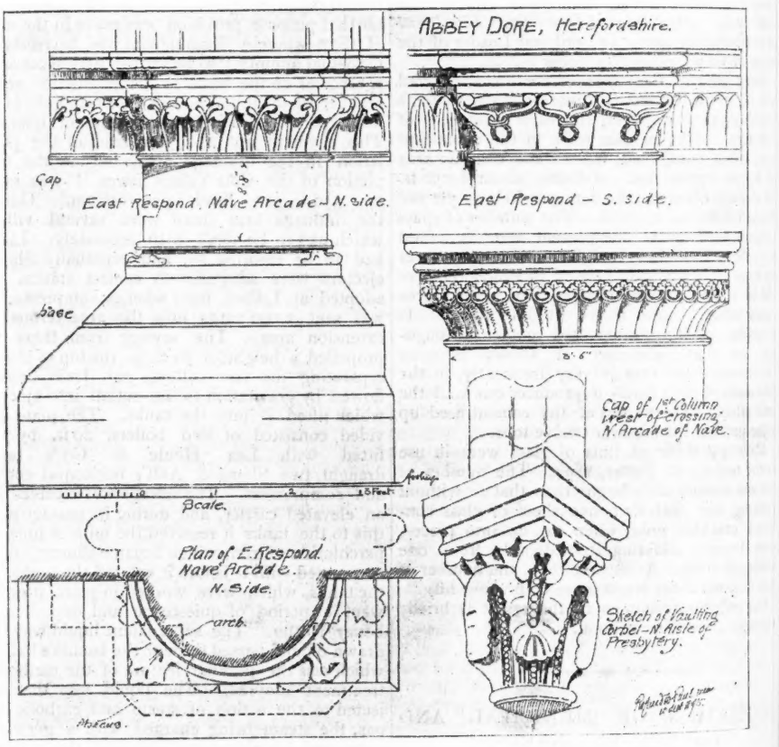
In the year 1147, Robert Lord of the neighbouring Castle of Ewyas Harold founded the Abbey of Dore for Cistercian monks. In the same year Margam was founded also as a Cistercian house by Robert, Duke of Gloucester, and for reasons that will appear later this coincidence is an interesting one. The only facts during the period between its foundation and its Dissolution with the lesser Monasteries (of less than 200*l.* a year) in 1534 that seem to have any bearing on its architectural history are the issuing of letters by Bishop D'Aquablanca (1240-1268), recommending the building to the notice of the pious, and a consecration by Bishop Thomas de Cantelupe, Bishop of Hereford, 1275-1282.

During this period several grants of land had been made to the Abbey, and many people of note, including the founder, Robert of Ewyas, and Roger de Clifford, had been buried within its walls. We thus have a period of a hundred and forty years, in which the fabric was no doubt gradually growing, and becoming of considerable importance as a monastery. Nothing of any importance as affecting the fabric seems to have been recorded between this date and the Dissolution. The church then passed into the hands of a certain John Scudamore, and just a hundred years later the presbytery and transepts were reconsecrated on Palm Sunday with much pomp, and henceforth the church became the parish church of Dore.

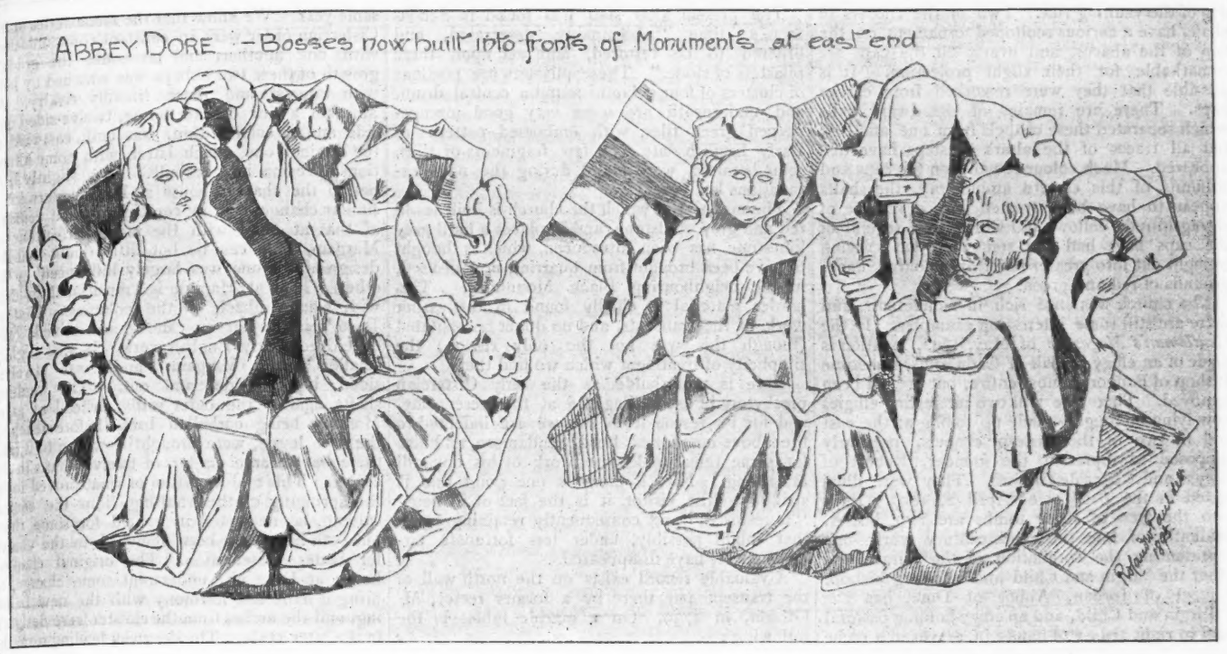
Until the excavations undertaken by Mr. Paul were commenced the only portion of the fabric remaining above ground was the transept and presbytery, with some ruined walls of the sacristy and chapter house on the north, and the eastern responds, and first pair of columns westward of the nave arcade.

From what remained, however, it was easy to see that the church had the same characteristics of planning and arrangement as other churches of the Cistercians. The transepts had originally two chapels in each wing, and the presbytery, aisleless, projected one, perhaps two, bays beyond. The nave, as the remains against the transept clearly showed, had narrow aisles, the centre alley remaining, however, about the same width as that of the presbytery. All this was evidently a portion of the original scheme, and it is reasonable to suppose that the presbytery in its early form was completed, and resembled somewhat that of Buildwas. Dore, however, no doubt, profited considerably by the benefactions and grants of land that were made by local families


ABBEY DORE - Herefordshire.
Cap from the South Arcade of Nave - found in 1895.
dotted part Coloured red throughout Cap.
Scale.
12 inches
Bosses
Probably from vaulting of Nave Aisles.


ABBEY DORE, Herefordshire.
Cap
East Respond. Nave Arcade - N. side.
East Respond - S. side.
base
Scale.
Plan of E. Respond Nave Arcade. N. side.
arch.
Cap of 1st Column West of Crossing N. Arcade of Nave.
Sketch of Vaulting Corbel - N. side of Presbytery.

* The series of the "Abbeys of Great Britain" is continued this month with illustrations of "Abbey Dore." The next of the series (Jervaulx) will appear in the number to be published on July 4, 1896. Particulars of the series will be found on p. i.



and Bishop Aquablanca's letter in later times also gave a stimulus, doubtless, to the building operations, and the burial of its founder, Robert, of the neighbouring Castle of Ewyas Harold, and other notabilities would naturally draw local if not more distant attention to the fabric as an object of veneration. Be this as it may, we can distinctly trace in its plan the scheme of the later enlargement. The course adopted was a simple one. The east walls of the inner chapels of the transepts were pulled down, side aisles were added to the presbytery and an eastern procession path with five chapels was constructed beyond the high altar. The presbytery beyond the transept chapels was rebuilt with arcades at the sides and end, and the walls between the old inner chapels and the presbytery were pierced by narrow-pointed arches of three orders of chamfers. In this way, although two altars had been done away with in the transepts, five had been added at the east end, and as aumbreys in the south aisle prove, two side altars were introduced there, making a total of seven in all.

The simplicity that, in the earlier period of the Cistercian foundations, was always characteristic of their churches, was also a marked feature of Dore. Beyond the carving of the caps of the main arcades and vaulting shafts, the ornament necessary on monuments and shrines, everything at Dore depended on simplicity of moulding and beauty of proportion for its effect. Later days, with relaxed rules, introduced more elaboration of certain details, but it is noteworthy that nothing in the recent excavations on the site of the nave points to any great elaboration of the main fabric. Painting was, indeed, largely brought to bear on the plastered surfaces and to heighten the effect of the carved capitals, especially at the east end and in the neighbourhood of the "pulpitum," but nothing has been found which could by any means lead to the conclusion that the early simplicity of general outline was departed from, even in days of greater prosperity.

Until the autumn of last year the only portion of the nave appearing above ground was a respond and column of the nave arcade on either side, immediately west of the "crossing;" a portion of evidently an old wall, forming for a great portion of its length the boundary of a kitchen-garden, and at its extreme west end at about 170 ft. from the west wall of the transept a projection of a little over a foot. Much had been from time to time suggested as to the probable length of the nave and the number of its bays, and Mr. Paul commenced work at the west end. The projection at the end of the wall proved to be an angle buttress of the *cellarium*, and the west wall was found 28 ft. back from this point, showing that at Dore, as at Kirkstall, the *cellarium* projected beyond the west end. With the position of the west wall fixed, and with the one bay next the crossing as a guide, it was not difficult to set out the number of columns in the intermediate space, and on a trench being dug, commencing from the east, the discoveries now shown on the plan were made. The first two columns had been left by Scudamore as a buttress to his west wall, and they in their turn were buttressed by masses of masonry on their west sides. The second column proved highly interesting, for at this point the great screen, or the base of it which divided the monastic choir from the nave was unearthed. It was a wall about 5 ft. in thickness, its inner face in line with the centre of the column and with projections where it passed in front of the columns on their west sides. It was built up largely of worked and carved stone, and some very beautiful pieces of Early English arcading were found in its core, showing that either the present wall was the second on the same site, with earlier work re-used in its construction, or that the "pulpitum" had been thrown down at the Dissolution, and the carved work of neighbouring shrines had been broken up and thrown into it.

Between this and the next column was evidently a doorway, and south of this column, just above the old floor-level, some elaborate fragments of tracery, gilt and coloured, were found, evidently forming part of a shrine or canopy of a tomb. In the next two bays the columns were connected by screen walls about two feet in thickness, plastered on both faces, the plaster on the north facing the aisles being white, while that facing the centre of the church was coloured in red, blue, yellow, and green. These were the screen walls corresponding with those so clearly shown in the nave of Tintern Abbey, and a feature of more than one Cistercian plan. The structural nave by these excavations proved to be of nine bays, two of which at the east were occupied by the choir of the monks. The part westward was probably used as a church of the Lay Brothers, and was approached by them through the doorway in the north aisle from the *cellarium*, across the "Lane"—the doorway still exists, and is shown on the plan. In the north-east corner one jamb of the cloister door was found, and during the digging of a new grave on the site of the south arcade, the corresponding projection of the "pulpitum" was found, and a portion of a very beautiful Early English cap, painted, evidently belonging to the column immediately west of the "pulpitum," and partaking in that general scheme of colour decoration which was a feature of this part of the church. Numberless stone roofing tiles were found, one or two Early English bosses in the north aisle, and fragments of lancet jambs, vaulting ribs, and corbel table.

The columns of the nave were circular 3 ft. 6 in. in diameter, standing on moulded bases with square plinths. The arches—one on the south remains (see view)—were pointed but had early mouldings. The caps of this nave arcade differed considerably, the first-mentioned on the north side being Norman in its detail, and the one found having fully developed Early English foliage (see block).

The conclusions to be drawn from the excavations are that the nave was of nine bays, divided into two at the second bay from the east by the "pulpitum." It remained as at first designed by the original founder, and was Transitional in character. Probably in the middle of the thirteenth-century the side aisles were revaulted—it is possible that a stone vault had not previously been put up—and this is clearly shown by the section of the vault ribs found, and the Early English carved bosses.

The three arches that connected the nave with the transepts are now walled up, and the entrance to the church is now by a wooden porch of Scudamore's time, on the south face of the transept. This is shown in the general view from the south. The transepts were structurally divided into two bays each with eastern chapels, a doorway in the south front, and two at the north end of these two latter. One at a lower level led to the sacristy, the other at a higher level formed the communication between the church and the dorter by means of the "night" stairs.

Everything here is of extreme simplicity. The windows are lancets, with broad inner splays. The arches leading to the chapel are pointed, and ornamented with a rude form of dog-tooth, while the caps and bases are square, slightly chamfered at the angles, and when carved are of the stiff Transitional type. There are two sets of vaulting corbels at different levels over the crossing, but this portion of the church was receiled by Scudamore, and the vault, if it ever existed here and in the presbytery, has entirely vanished.

The chapels and aisles of the presbytery are vaulted with sandstone rubble and plastered, and many of the caps and shafts at the east end retain considerable traces of colour.

There is in the detail of the caps in the presbytery the same mixture of early and late forms as in the nave—two of the groups of columns supporting the three arches behind the altar are moulded only—the other two carved with conventional flowers—some partake of the Norman character with stiff conventional foliage; others in places show the first trace of development towards the undercut work of the middle of the Early English period. The first arches east of the crossing are of three orders of chamfers, narrow and lofty in proportion. The two remaining bays have more richly-moulded arches, also of three orders, the outer two having continuous imposts, the innermost brought down into a semi-circular column.

The abaci of these caps are all semi-circular—so are all those in the north aisle—but in the south aisle some are square, as in the early chapels of the transepts.

The whole of this portion of the church is lighted with single lancets in each bay. At the east end, over the altar, is a fine triplet, and at the south end of the transept two lancets with a vesica over.

The eastern ambulatory, with its five chapels, is the most beautiful portion of the church. Here a further stage has been reached, and more development attained in the carving, and mould-

ing of the vaulting ribs. Two of the clusters of shafts have a curious scolloped ornament on the top of the abacus, and nearly all the caps are remarkable for their slight projection. It is possible that they were reworked from earlier caps. There are remains of the dwarf walls which separated these chapels from one another, but all traces of the altars or steps have disappeared. Much colour remains on the caps and columns of this eastern ambulatory, the shafts appear to have been treated with a scheme of zigzag in red, yellow, and white, and several of the caps have had the somewhat flat carving brought out into greater relief by coloured backgrounds of red and green.

The church was once rich in monuments, and there are still some interesting examples. In the *Gentleman's Magazine* of May, 1792, mention is made of an effigy in oak of Caducanus, sometime Bishop of Bangor, almost entire, but it had been removed. There are still two interesting effigies now lying on roughly made-up tombs at the east end in two of the eastern chapels, popularly supposed to represent the founder, Robert of Ewyas and Roger de Clifford. They were illustrated in the *Builder* of April 8, 1893. Built into the face of these tombs are two bosses, evidently of late thirteenth-century work—one representing the coronation of the Virgin, the other the Virgin and Child and kneeling Bishop. A seal of Jordan, Abbot of Dore, has the "Virgin and Child, and an effigy holding pastoral staff in right arm, and hands in prayer in a niche below" (James). This seems to point to the fact that Abbot Jordan did some of the later vaulting at Dore, but there is no record that we know of to show from which portion of the church these bosses were brought, but the moulded ribs agree in section with those belonging to the Chapter House. They are, however, highly interesting, and are some of the latest carved work in stone of the Mediæval period which remains here (see block).

In a trefoiled-headed recess on the north side in the bay, east of the north door, is a small effigy of a Bishop (also illustrated April 8, 1893), with the inscription (SER)VA : PONTIFICIS : COR ..... SANCTVM : XPSTE : JOH(ANNES). It commemorates John Breton (Bishop of Hereford, 1269-1275), and covered his heart. His body would most probably have been buried in the Cathedral. In addition to these effigies, one or two portions of shrines have been discovered in the nave. The first discovery was made about ten years ago, when sinking a hole in the middle of the nave. A portion of a shrine of early English date, with considerable traces of gold and colour came to light, and it is now placed for safety at the east end behind the altar. Last year, during the excavations, another portion of this shrine was found west of the pulpitum, and some fragments of tracery evidently of early fourteenth century date, also elaborately decorated. We can reasonably conclude, therefore, that both westward of the "pulpitum," in the nave, and in the immediate neighbourhood of the high altar and the eastern chapels, there was a highly interesting and elaborate series of monuments to the founder, Roger de Clifford, and more, perhaps, than one of the Bishops of Hereford, besides the tombs of the Abbots themselves. The aumbreys in the south aisle also show that there were two side chapels or chantries perhaps in connexion with monuments placed in the presbytery arches.

The font, now against the south-west pier of the crossing, was either introduced by Scudamore, or brought by him from the old parish church of Dore, which had fallen into decay. It is a simple octagon, and is perhaps made up from other worked stones. But the most interesting feature is its step, which bears on four of its sides a Lombardic inscription :— HVGO.OLIM.DECCAN. DE WEBBELE.ME.FE. The inscription is upside-down, and unfinished (the last word is of course FECIT). Hugo de Bissop, dean of Weobley, as it is now spelt, was buried in the church there, and his place of interment in the south chapel is still marked by a slab with a fine cross. This slab is figured in "Arch. Camb.," vol. xv. The step of this font may perhaps have been a portion of a churchyard cross, of which there is more than one in the neighbourhood. There is no stained glass of an earlier date than Scudamore's time, but the triplet over the east end filled by him at his restoration in 1634, and dated, is very effective, and represents the Ascension, the Twelve Apostles, and the Evangelists. In one of the aisle lancets on the south is a fragment of heraldic glass bearing the arms of Carwardine—*sa*, a sling in bend between two pheons *arg*.

The present altar slab was found in Scudamore's time "abominably desecrated, and ordered to be restored, and set upon three pilasters of stone." These pilasters are portions of clusters of four columns round a central drum, and underneath are some very good lozenge-shaped green tiles, with embossed patterns of Early English date. A few fragments of tiles, some heraldic, were found during the nave excavations last year.

The material of which the church is built is old red and grey sandstone, and in places a hard grey limestone has been introduced, which is thought to have been brought from quarries, now disused, in the neighbouring Black Mountains. This harder material is chiefly found in the earlier work of the transepts, and no doubt necessitated (though this was not the only reason) the simplicity of treatment which we find there.

Dore is remarkable as the only Cistercian presbytery in use in England at the present day, and for its rescue from ruin we are indebted to the above-mentioned Lord Scudamore, and also for some remarkable woodwork of his day still remaining. For, if there is one point that is striking to the visitor, it is the fact of its being "unrestored," and consequently retaining much that might possibly, under less fortunate circumstances, have disappeared.

A valuable record exists on the north wall of the transept put there by a former rector, M. Gibson, in 1739. On a marble tablet is the following :—

"A great part of this church being broken down and all of it, together with the Tithes of this Parish, being made a Lay Fee by Act of Parliament at the Dissolution of the Abbey 27mo. Henry viii. This remainder of the said church was restored to a sacred use, the walls thereof being greatly repaired the roof and tower entirely rebuilt, the rectory founded, and very bountifully endowed with all the Parochial Tithes, and with Glebe and Manse, by the Pious and ever memorable John Lord Viscount Scudamore upon the 22nd Day of March Anno Domini 1634."

The value of this tablet can hardly be overestimated in dealing with the transepts, crossing, and presbytery—the portion now roofed. It disposes, even if the knowledge of the Cistercian plan did not do so, of the theory that the present tower was in its main structure original, and it accounts for many little anomalies in the building that might otherwise be a puzzle. That Lord Scudamore found it in a very ruinous condition, and that the "walls thereof 'were' greatly repaired" would also account to a great extent for the total disappearance of much more of the western arm than one would otherwise have expected. Since Scudamore's day Dore has never been more than a village, and although no doubt at the Dissolution a certain amount of material would be carried away for neighbouring buildings, this would not account in itself for the absence of such a large amount of worked stone. And during the excavations carried out last year it was found that the further westward digging was carried the less the material found.

The conclusion is, therefore, that Scudamore, having to deal with a ruinous building of nearly 300 ft. in length, decided on re-roofing the transepts and presbytery, and drew the necessary material for their repair from the nave, commencing with that at the west end, and gradually using the stone eastward until the amount required was obtained.

With regard to the roofs also it is evident that the roofs of the aisles and eastern chapels of the presbytery were lowered in pitch, doing away with the small gabled finish over the lancets. Much of the corbelling, too, on the west side is evidently old material re-used.

Viscount Scudamore added the existing choir-screen under the eastern arch of the crossing, a boldly-designed piece of Renaissance work; he also erected a western gallery, a pulpit with sounding-board over, pews, and a south porch against the south wall of the transept. The font doubtless also dates from this period. The plastered walls of the transept were covered with black-letter texts; and two frescoes, one of King David over the western gallery, another of Time in the south transept, are curious examples of their date. There is a late tomb in the south transept chapel to Serjeant Hoskyns, with armorial bearings.

Of the monastic buildings but little remains above ground; but the sacristy walls are standing north of the transept, and the interesting remains of the twelve-sided chapter-house.

Reference has been already made to the fact that Dore and Margam were founded during the same year. We know that the monasteries of the Cistercian order were in constant communication with one another, and no doubt the gradual growth of these two abbeys was watched by both with interest and much friendly rivalry. At Margam a fine chapter house, twelve-sided outside and circular within, was built eastward of the original one, which latter, with some alterations, became its vestibule. At a slightly later period the chapter house at Dore underwent a similar change, and in comparing what remains of that at Dore with the more perfect one at Margam, there can be but little doubt that the design of the one was largely influenced by the other. That at Margam is Transitional in date with square abaci to the columns. That at Dore was, as far as can be ascertained, fully developed Early English work. It was slightly smaller than Margam, and was twelve-sided both inside and out. The vaulting shafts against the outer walls, instead of as at Margam being corbelled back before reaching the seat levels, were brought down on to it, and there was a large cluster of twelve shafts in the centre. This and a portion of what proved to be the springing of the vaulting from the central column, lay neglected in a field for some time, but both have now been removed to the church for better preservation. The original chapter-house at Dore also underwent some change, to bring it more into harmony with the new building, and the arches from the cloister were designed in the later style. The doorway leading from the cloister to the sacristy is also of this date.

Of the other monastic buildings but scanty traces remain. Some mounds and uneven ground north of the chapter-house vestibule mark the site of the day-room. The cloister is now a kitchen garden, and immediately north is the stream, with traces of the masonry with which it was arched over. To the north of this is a very thick wall running for a distance of a hundred feet north, doubtless one of the walls in the neighbourhood of the Frater. West of the cloister was a "lane," as at Kirkstall, and further west again, projecting beyond the west front of the church, was the *cellarium*. Of this some remains of the return walls and the end wall remain, and also a vaulting corbel.

The Abbey mill lies a few yards west up the stream, but there is nothing of interest now to be seen there.

R. W. PAUL.

COMPETITION DESIGN FOR ROYAL INSURANCE BUILDINGS, LIVERPOOL.

WE published a fortnight ago, in our issue for March 21, the exterior and interior perspective views of Mr. Belcher's fine and unusual design submitted in this competition. Had we received the geometrical elevations at the same time, we should have published them and devoted the illustrations of that issue of the *Builder* to a design which was quite worth full illustration. It was owing to Mr. Belcher's own modesty in regard to his work that the geometrical drawings were not at first forwarded to us, and only reached us, with an intimation that we were welcome to publish these also if we thought them of sufficient interest, too late to be incorporated with that week's illustrations.

But considering the design to be one of unusual interest and originality, we give the geometrical elevations now—better late than never, more particularly because we think they will be of interest and value to our student readers and to young architects, who may wish to study the constructional basis of the architectural treatment shown in the perspective views already published.

The ground plan was given on page 256 *ante*.

ARCHÆOLOGICAL SOCIETIES.

SURREY ARCHÆOLOGICAL SOCIETY. — The forty-first annual meeting of this Society was held on the 25th ult. at 8, Danes' Inn, Strand, when a letter was read from the President, Viscount Midleton, regretting his inability to attend. In his absence Mr. J. F. Eastwood presided. Mr. Mill Stephenson, F.S.A., Hon. Secretary, read the notice, and submitted the annual report of Council and balance-sheet. An afternoon meeting of the Society was held at Darenth, Kent, on June 15 last, when the extensive Roman remains recently discovered near the village were described by Mr. George Payne, F.S.A., Hon. Secretary of the Kent Archæological Society. A visit was also paid to Darenth Church, which was described by the vicar, the Rev. H. B. Stevens. The

annual excursion was held on July 23, at Godalming, whence Hascombe, Dunsfold, and Chiddingfold were visited (vide *Builder*, August 10, 1895). The part of the Society's Collections (vol. xii., part 2) for the year 1895 was duly issued to all members not in arrear with their subscriptions. In this part are valuable papers on "The Early Earthworks and Camps in Surrey," by Mr. F. Lasham and Mr. H. E. Malden. Mr. A. Ridley Bax, F.S.A., contributes a paper on "The State of certain Parish Churches in Surrey in 1705." The catalogue of Church plate is still being continued, as are also the extracts from Surrey wills. The visitation of Surrey is almost completed; a few pedigrees still remain in hand. In the early part of the year an extra volume, entitled "A Calendar of the Feet of Fines relating to the County of Surrey," was issued to the members. For this most valuable calendar the Society is indebted to Mr. F. B. Lewis, who not only extracted the entries from the original rolls in the Public Record Office, but also edited the work and compiled the indices. The Calendar itself is of interest not only to Surrey antiquaries, but also to antiquaries in general, as there are a very large number of Fines classified with the County of Surrey which relate to Southwark and the adjacent parishes and manors. In many cases, where a party to a fine was a citizen of London, mention is made of the guild to which he belonged, and many missing links in genealogy may be traced out and settled. The Council deplore the loss of no fewer than four Vice-Presidents—viz., Mr. J. W. Butterworth, F.S.A., Mr. Granville Leveson Gower, F.S.A., the late Bishop of Winchester, and Major-General Sir Henry Rawlinson, G.C.B., F.R.S., Mr. Butterworth died early in the year, as mentioned in the last annual report (vide *Builder*, April 6, 1895). Mr. Leveson Gower joined the Society soon after its foundation, and became a Vice-President in 1864. He took a great interest in the affairs of the Society and contributed numerous papers to the Collections. The number of members is 308—viz., annual, 212; life, 94; and honorary, 2. During the year 11 new members have been elected—viz., 9 annual and 2 life. The report and statement of accounts were unanimously adopted. Messrs. A. R. Bax, G. Curling, S. W. Kershaw, F. A. H. Lambert, H. E. Malden, P. Norman, and John O. Scott, F.S.A., the retiring members of the Council, were re-elected, as also were the Hon. Secretaries, Mr. Mill Stephenson and the Rev. T. S. Cooper, and the Auditors, Messrs. C. T. Davis and W. F. Potter, likewise the Collector, Mr. W. P. Ivatts. On the motion of Canon Blakiston, a vote of thanks was passed to the Chairman. This terminated the proceedings.

ENGINEERING SOCIETIES.

CIVIL AND MECHANICAL ENGINEERS' SOCIETY.—At the meeting of this Society, held on the 27th ult., Mr. A. Myall, A.M.Inst.C.E., read a paper on "Wire Netting Machinery." The author reviewed the history of his subject, drawing special attention to the patent of 1854 of J. Whitehead, in which was embodied the essential principle upon which the majority of subsequent machines have been constructed for manufacturing wire netting. He entered into the details of many machines, and pointed out their main features and the reasons for their adoption or rejection, and concluded his observations by drawing attention to the various defects of the machines at present in use, and indicated where, notwithstanding all that had been done and the thousands of miles of wire netting that had been made, there was still plenty of room for improvement in the machines now in operation. A discussion ensued, and the following gentlemen took part therein:—C. T. Walrond, Hal Williams, E. H. G. Brewster, J. N. Cooper, W. Cooper Penn, and Chester Dawson.

COMPETITIONS.

TECHNICAL SCHOOLS, PAISLEY.—Some time ago the Governors of the Paisley Technical School issued invitations to nine architects to send in competitive plans for the Technical School to be erected in George-street. The assessor was Dr. Rowand Anderson, Edinburgh, and the estimates were made up by Mr. James B. Lamb, architect and measurer, Paisley. Dr. Anderson placed the designs in the following order of merit:—First, plan No. 7; second, No. 4; third, No. 3; and fourth, No. 1. As regards plan No. 7 the assessor recommended the Governors to accept it as the design to be executed. This was agreed to, and, on opening the sealed envelope, it was found that the architect was Mr. T. Graham Abercrombie, Gilmour-street, Paisley. As the plans placed second and third were by Messrs. John Honeyman & Keppie, architects, Bath-street, Glasgow, the Governors, in consideration of the plans being by the one firm, agreed to award them the first premium of twenty-five guineas, and the second premium of fifteen guineas was awarded to the plan placed fourth. The architect of this plan is Mr. W. D. M'Lennan, Paisley. The cost of the new school is estimated to be 17,000*l.*

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday at the County Hall, Spring-gardens, Sir Arthur Arnold, Chairman, presiding.

Loan.—The Finance Committee recommended, and it was agreed, to lend the Fulham Vestry 3,300*l.* to defray the cost of constructing a concrete wall at Town Mead Wharf, Fulham.

Boundary-street Improvement.—It was agreed, on the recommendation of the Housing of the Working Classes Committee, that the work of erecting the superstructure of Block C on the area comprised in the Boundary-street improvement scheme be executed by the Council without the intervention of a contractor, and that the plans, specification, quantities, and estimate be referred to the Works Committee for that purpose; but that, in the event of that Committee not being satisfied of the sufficiency of the estimate, the Housing of the Working Classes Committee be authorised to invite tenders.

Old-street Widening.—The adjourned report of the Improvements Committee recommended that the Council should apply in the next session of Parliament for powers to widen Old-street, Shoreditch, at its junction with Goswell-road, and to widen the southern end of Goswell-road, on the betterment principle, at an estimated cost of 164,500*l.*

The recommendation was ultimately agreed to.

Fleet-street Widening.—The Council agreed without discussion to contribute on the usual conditions one-half of the net cost of widening Fleet-street between Ludgate-circus and Bride-lane, as proposed by the City Commissioners of Sewers, such contribution not to exceed the sum of 15,780*l.*

The Water Question.—Mr. Dickinson, Chairman of the Water Committee, asked the Chairman of the Council what course he proposed to take with regard to his position as negotiator for the purchase of the water companies in consequence of the rejection of the Council's Water Bills in the House of Commons.

The Chairman: The negotiations have not gone further than was indicated in my reply to Mr. Idris on the 10th. I may, however, add that there were two points upon which I took firm ground—(1) that we should consider procedure by arbitration under the Lands Clauses Act as overpassed by the work of the Plunkett Committee, and (2) that we should avoid the Birmingham precedent of payment by perpetual annuities without power of redemption. I maintained that in any agreement the ratepayers are entitled to the advantage of their superior credit, and that therefore if the payment were not by a lump sum the annuities representing dividends should be reduced or redeemable at fixed periods at an agreed price, and that failing agreement the arbitration should be full, free, fair, and decisive, giving to all parties the due consideration of their respective claims. Under present circumstances I shall not proceed with the negotiations.

The Joint Parliamentary and Water Committee presented a report referring to the rejection by the House of Commons of the Council's Water Transfer Bills. This was signed by Mr. M'Kinnon Wood as Chairman. No recommendations, however, were appended.

The Earl of Onslow objected to the tone and character of this report, and, on the motion "that it be received," moved to leave out paragraph 1.

This led to a long and acrimonious discussion, but eventually the report was received.

The Works Department.—It was decided to adjourn the consideration of a report showing that the cost of jobbing works carried out by the Works Department for the Bridges Committee since October, 1895, has been 16·65 per cent. below the value according to the amended schedule. The figures were:—Estimates, 3,338*l.*; actual cost, 2,781*l.* 18s. 8d.

The Council, having transacted other business, adjourned for the Easter Holidays.

The Student's Column.

CARPENTRY AND JOINERY.—XIII.

FLOOR COVERINGS.

HAVING treated of the various forms of naked flooring, the subject which naturally follows is the covering with which they are overlaid and its method of fixing, from the carpenter's or joiner's standpoint. The subject can be conveniently treated under the following headings:—

1. General remarks.
2. Ordinary flooring.
3. Rebated and other forms.
4. Wood-block floors.
5. Parquet floors.

1. GENERAL REMARKS.—Floors may be either laid *straight joint*, in which the side joints of the boards are continuous throughout their length, which is the most usual way; or they may be laid *folded*, that is, when the side vertical joints are not continuous, but are set out in bays of four or five boards in one *bay* or *fold*. This latter method is more often adopted on the Continent.

The boards used for flooring are battens or deals, which should be perfectly free from sap, large loose or dead knots. As soon as possible after the building has been commenced and is ready for their reception, they should be laid out in the building across the floor joists, bottom upwards, so that they may have every opportunity of drying and seasoning without being damaged by being walked upon. In laying floor boards, they may be either nailed down one after another, or in cases where it is expected they are not properly seasoned, one is laid, then a fourth, leaving a little less space for the two intermediate ones than their actual width; these are then forced into position by workmen jumping on the two intermediate boards, and thus forcing them into position, when they are permanently fixed by brads. In this method the boards are said to be folded.

In order to minimise the effects of shrinkage floor boards should be laid in as narrow widths as possible, from batten widths to strips of 3 in. and 4 in., as the joints can be kept tighter. The edge of each joint is "shot" or smoothed off with a plane, forming what is known as a butt or plain joint. The boards should all be brought to the same width, have their edges shot, and be gauged with a fillister plane. In laying they are generally brought tightly together by means of flooring-cramps; the method of being "laid folding," already described, is only used in common floors. The board, being cramped into position, is secured to the joist by "flooring brads," or flat-sided nails, which, being driven in parallel to the grain, have no tendency to split the board. Secret nailing is adopted in rebated floors, and in the better class generally, and is seen in fig. 152,* which sufficiently explains the process. The boards being seldom long enough to go right across the room their ends have to be butted against an adjoining board; this is called a *heading* joint, and it is evident that these should occur on a joist in order to make a satisfactory junction, and that they should break joint on plan in order to counteract any tendency of the boards to slide out of position. There are different ways of forming these heading joints. They may be simply *butt* joints, or, as is usually the case, they may have splayed or bevelled headings, as at H in fig. 150. This is the better course, as it is more likely to keep the ends in position. Other forms are grooved and tongued, rebated and tongued, or forked headings, which are seldom used in practice.

2. PLAIN OR BUTT JOINTED FLOORING (fig. 150).—In this the boards are simply laid side by side, their edges having been previously shot, and are held down to each joint by two nails.

3. REBATED AND OTHER FORMS.—The practice of joining the edges of boards by means of rebates, or of tongues and grooves, appears to have been introduced into England in the fifteenth century. The inevitable shrinkage in floors will always cause a straight-jointed floor to open along the edge. This is to be avoided in all cases, but it is especially harmful in certain

* The illustrations referred to in this article will be found on the sheet published in our last issue, which included the illustrations to two articles.

cases. For instance, in a ground floor resting on sleeper walls, and having no ceiling beneath, the air would blow up through the joints and cause draughts, and in a warehouse where no plaster ceilings are put, the dirt and dust would pass from one floor to another unless some means, such as we shall show, were introduced as a preventive. It is advisable, therefore, for sanitary reasons, to use some form of tongued floor. Other reasons, such as the unsightliness of the nailholes, prove the necessity for the rebated floor. There are several forms, some of which we illustrate.

Rebated flooring.—This is shown in fig. 151, and consists in each board having a rebate on each side, fitting into that of the adjacent one, the boards being nailed as in an ordinary floor.

Rebated, grooved, and tongued.—Fig. 152 is an extension of the above joint, in which it will be observed that besides the rebate a groove and tongue is worked on the adjacent edges of each board. In this case, the boards can be secret-nailed, as shown, and they are held in position by the tongue. This form is used in good floors, in which visible nails would be an eyesore.

Ploughed and tongued.—Fig. 153. In this form, a groove is run along the side of each board by means of a plough plane, and a wooden or iron tongue is inserted; these should be kept as low down as possible, in order that by the wear of the floor it may not be reached. This form is specially suitable for warehouses, in which no plaster ceilings are fixed, as it prevents dust from descending through the open joints of the floor, and is not much more expensive than plain shot edges.

Grooved and tongued.—Fig. 155 shows this method, which is not often used. A groove is run along one board, and a tongue on the adjoining board fits into it. This form possesses the disadvantages of cost, and has no advantages over the last-named joint.

Rebated and filleted.—Fig. 154. This form is essentially one for floors on which rough work is anticipated, as in warehouses and barracks. A thin rebate is taken out of the underside of each edge of the board, which is occupied by a metal or wooden tongue. It will be seen that almost the whole depth of the floor is available for wear before the tongue is exposed.

Dowelled, Fig. 156.—Dowelled floors have small oak dowels fitted at intervals along the edges of the boards, into holes formed to receive them. They are little, and do not possess any advantage over a good ploughed and tongued floor.

4. WOOD-BLOCK FLOORS.—This form of covering has of late years been increasingly used. It is formed of blocks of wood, varying from about 9 in. to 12 in. in length, 3 in. in width, and 1 in. to 2½ in. in depth. These are usually laid on a solid bed of concrete, on the solid ground, or in conjunction with some fireproof system of construction in upper floor. The advantages are that it leaves no space for vermin, is free from the noise and echo of common boarded floors, and is easily replaced. There are several varieties of wood blocks, and many patents have been secured in regard to their laying. These all have the same object in view, namely, to counteract any tendency the blocks may have to rise, either from damp or other causes. Geary patent invincible system (fig. 146) has every block secured to the substructure by means of metal keys or studs dovetailed into the blocks, one end of the key being firmly embedded in the mastic or bitumen on which the blocks are laid.

Duffy's patent wood-block flooring, fig. 157, has been much used. In this patent the wood blocks have dowels placed, as shown, in holes in each block, thus keeping each in its place. Security is further obtained by the lower edges being dovetailed and laid in a bed of bitumen composition. This flooring is well adapted to all kinds of work. For churches, wood blocks 1½ in. may be taken as sufficient; for schools, 1¾ in. to 2 in.; and for factories and barracks, where very rough wear is expected, blocks as thick as 2½ in. may be employed.

5. PARQUET FLOORS are composed of thin layers of wood worked into some geometrical pattern, either extending over the whole room or used only as a border round the room. The parquet may be laid direct on to the joists or are often laid on the top of an ordinary floor. This type of flooring is kept clean by the use of turpentine and waxing, and is in every respect a more sanitary finish to a room than ordinary washed floors. Parquet is made in all thicknesses from ¼ in. to 1 in., and of oak, walnut, or teak, &c.

Parquet floors are also made to be removable, and are often laid down for temporary purposes, as for dances, &c. Mackenzie's patent removable parquet flooring is easily fixed, each section being grooved and tongued with metal tongues, and fixed with secret nails. This flooring has a metallic backing which prevents its being affected by any shrinking of the sub-floor. Cork carpet floors are also frequently laid down for bath-rooms, as the material being a non-conductor it is warm to the touch.

There are various other patents for these floors having the same object in view, but they need not be mentioned here.

6. SPECIAL FLOORS.—Floors have often to be constructed for special purposes. Those used for dancing should always be specially treated, so as to give the necessary spring. To effect this object floor boards are often laid on indiarubber, as at the King's Hall, Holborn, and elsewhere. At the King's Hall the flooring to the main hall is floored with oak in 3-in. widths, laid on strips of indiarubber placed on the joists, about ½ in. thick, in order to give the requisite elasticity for dancing purposes.

Rondelet, in "L'Art de Bâtir," mentions a peculiar floor erected at Amsterdam, in which no joists whatever are used. It is a room 60 ft. square. Strong wall-plates are fixed round the room secured with iron straps at the angles, and rebated to receive the flooring, which consists of three thicknesses of 1½ in. boards without any joists. The first layer is placed diagonally across the room, and made to rise 2½ in. higher in the centre than the sides. The second layer of 1½ in. boards is also laid diagonally, but the reverse way to the first, to which it is well nailed. The third layer of 1½ in. boards is placed parallel to one side of the room, and is also well nailed to the boards beneath. All the boards are grooved and tongued to each other, and thus form a solid floor 4½ in. in thickness. Other instances could be named, which are not, however, of interest in a practical way.

GENERAL BUILDING NEWS.

EXTENSIVE BUILDING OPERATIONS AT SHILDON, DURHAM.—Building operations on a large scale are about to be carried out at Shildon by the North-Eastern Railway Company. The Company, seven months ago, commenced the erection of a timber storing shed, 400 ft. in length by 120 ft. in width. The contractors were Messrs. Rhodes and Bellerby, of York and Leeds respectively. The Company followed this up by purchasing about 100 acres of land, and the whole of one side of a street of houses, preparatory to making the proposed extensions. The necessity for extra lighting is being met by the erection of a gasometer and the general extension of the gasworks. The extensions will occupy a space of 1,178,320 square feet. The extensions at New Shildon include five large shops to be erected parallel with the engine-shed, and will comprise a building shop 300 ft. by 60 ft., two machinery shops, 300 ft. by 49 ft.; an iron machinery shop 300 ft. by 47 ft.; and a wheel lathe shop 300 ft. by 47 ft. The present truck-repairing shops (327 ft. by 60 ft.) and the smiths' shop, occupying an area of 245 ft. by 94 ft., are all of the present building that will remain intact. The new structures will include offices, mess-rooms, and ambulance hall; these will be a pile of buildings two stories in height. The basement area of the offices will be 72 ft. by 60 ft., and 40 ft. high; the mess-room, 40 ft. by 56 ft; the ambulance-hall will have a basement area of 53 ft. by 31 ft. South of the waggon-repairing and smiths' shop will be a waggon-wheel repairing shop 90 ft. in length. A large shed 230 ft. by 60 ft. will be placed to the north side of the forge for storage purposes, and two paint shops, 350 ft. by 60 ft., will also be erected. The contract for this concern is let to Mr. Bellerby, York, at 50,000*l.* The other contracts are:—Mr. Rhodes, Leeds, masonry, &c.; Messrs. G. Dodgson & Son, York, slating; Mr. Henry Shonksmith, York, plumbing; and Messrs. Bellerby Bros., Petergate, York, painting. No. 2 contract, which is let to Messrs. Shewell, Darlington, consists of the iron and steel work to be done about the works.

FREE LIBRARY, ROTHWELL.—At Rothwell, Northamptonshire, on the 19th ult., Captain Tibbitts formally opened a free library, reading-room, and District Council offices in a building the erection of which was commenced more than three hundred years ago, but which has only just been completed. The original builder was Sir Thomas Tresham, appointed by Queen Mary the last prior of the re-erected Order of Knights Hospitallers of St. John of Jerusalem. The Rothwell erection was intended for a market place on the ground floor and an assembly hall above. The building, however, never reached the roof. The floors disappeared years ago, and for 300 years the place has been the playroom of the children, save that for some time the circular stone staircase was used as the local lock-up. Captain Tibbitts, the lord of the manor, transferred his manorial rights in the site and building to the Council, who have spent nearly 1,000*l.* in transforming it into a library and public reading-room, from the plans of Mr. J. A. Gotch, of Kettering.

PROPOSED NEW WORKHOUSE INFIRMARY AT HALIFAX.—On the 25th ult. the Board of Guardians adopted the estimates which have been prepared for the proposed new workhouse infirmary at Halifax. The site selected is at Skircoat, on the outskirts of the town, and the estimated cost, with provision for 394 beds, is 95,935*l.* By the erection of pavilions the accommodation may, whenever necessary in the future, be increased to 642 beds. This portion of the scheme, if carried out, would entail an additional expenditure of 32,950*l.* The plans of the new infirmary have been prepared by Messrs. Horsfall & Williams, of Halifax.

TECHNICAL SCHOOLS, STAFFORD.—New technical instruction schools have just been erected in Victoria-square and Earl-street, Stafford. The buildings comprise offices and meeting-rooms for the Technical Instruction Committee, art and science class-rooms, and laboratories, together with cookery kitchen. The site occupies 1,146 superficial yards, a small portion of this area being reserved for extensions. The style is Classic, somewhat after the Tuscan order. The buildings are two stories high, with an ornamented façade of red brick with Hollington stone dressings. The principal portion of the buildings faces Victoria-square, with a frontage of about 90 ft., whilst in Earl-street the frontage extends for a total length of 85 ft., at the further end of which are entrance-gates. The premises are divided into two parts, one for teaching and the other for administrative purposes. The abruptness of the angle where the two frontages meet is relieved by a circular bay, finished off with an asphalte flat and ornamented with a stone balustrade on the front. The main entrance is from Victoria-square and leads to the administrative portion of the building. Leading from the vestibule is the officials' hall, on the right hand being the inquiry office. At the end of the hall a door filled with muffled glass screens off the committee corridor, 28 ft. by 6 ft., where there is a lavatory. Close by is the committee-room. The officials' corridor is 34 ft. by 6 ft., with a lobby leading to lavatories, &c., and doors opening into the director's and two clerks' offices, which face Earl-street. On the left of the corridor is a closet for storing documents, and a lift communicating with the basement and two upper floors. Adjoining are folding doors leading into the students' hall, which is in direct communication with the Earl-street entrance. Beyond the latter is a vestibule and swing doors with glass panels, giving access to the entrance-hall. The cookery kitchen, 30 ft. by 20 ft. by 13 ft., will also be used for laundry work. Adjoining the cookery class-room is the scullery. Further on is situated a cloak-room for the accommodation of about 60 female students. At the extreme end of the corridor is a passage leading to the wood-working shop. Separated from the workshop by sliding doors is a store-room. In the basement of the premises there is a cookery coal-store, a large heating chamber, and three store-rooms. The second story of the building is approached by means of a two-flight staircase, immediately opposite the Earl-street entrance and leading to the teaching department. The steps are of granolithic concrete. Off the half-landing, to the right, is a short flight of stairs leading to the male students' cloak-room and lavatories, &c. Close by is the sanitary museum on the left, measuring 60 ft. by 20 ft. This apartment has been built for purposes similar to those for which Parke's museum in London is employed, and it is proposed to exhibit here a collection of sanitary appliances, old and new, for the benefit of visitors. The room is lit by means of skylights running the whole length on each side of the roof, the extreme height of which is about 15 ft. The second floor of the building is arranged as science and art rooms. At the rear of the premises is a court-yard 32 ft. by 21 ft. The entrance-halls, corridors, and ground-floor are paved with Terrazo mosaic. The ventilation is conducted on the natural principle, extract vents being placed near the ceiling of each apartment. The roof itself is covered with Westmoreland green slates. The artificial lighting of the building is by electricity, supplied from the Corporation mains gas only being used in the building for laboratory work. The building has been erected from the designs of Messrs. Bailey & M'Connell, of Walsall; Mr. Henry Lovatt being the contractor. The heating is by Messrs. Jeffries, of London; the electric light installation by Messrs. Drake & Gorham, of Manchester and London, under the direction of Mr. W. O. Rooper, of Stafford, consulting electrical engineer; and the wrought iron-work by Brawn, of Birmingham. Mr. H. W. G. Tanner, of Bristol, was clerk of the works.

CHURCH, GLOUNTHAUNE, CORK.—It is proposed to erect a church at Glounthaune from the designs of Mr. S. Hynes, of South Mall.

RESTORATION OF BAMBURGH CHURCH, NORTHUMBERLAND.—The restoration of the ancient church of Bamburgh, on the north-east coast of Northumberland, has just taken place. In place of the plaster work at the east end, canopies of Caen stone have been erected enclosing figures from 3 ft. to 4 ft. high of St. Aidan, St. Oswald, St. Cuthbert, and others. The whole of the renovation has been

designed and carried out by Messrs. Hicks and Charlewood, architects, of Newcastle. The canopies have been carved by Messrs. Beall, of Newcastle, the figures being the work of Messrs. Milburn, of York. The total cost of the restoration and the sculptured reredos has been nearly 1,200*l.*

CHURCH SCHOOLS, ST. HELEN'S.—On the 26th ult. the Bishop of Liverpool opened the new schools at Parr Flatt, St. Helen's. The buildings, which have been erected to accommodate nearly 300 scholars, have been built from plans prepared by Mr. P. Ball, architect, St. Helen's, the work having been carried out by Mr. W. Molyneux, builder.

RESTORATION OF GRINTON CHURCH, SWALEDALE, YORKSHIRE.—The work of complete restoration which has been in progress at St. Andrew's, Grinton, during the past year is now nearly completed. The church has been restored at a cost of 3,000*l.* The restoration was entrusted to Messrs. Hicks & Charlewood, architects, of Newcastle. Mr. Simpson, of Darlington, has acted as clerk to the works.

RESTORATION OF THE TOWER OF BLAGDON CHURCH, SOMERSETSHIRE. — It is proposed to restore the tower of Blagdon Church as a memorial to the late Lady Wills. The architect is Mr. Frank Wills, and Messrs. W. Cowlin & Son are the builders.

TECHNICAL INSTITUTE, SALFORD.—On the 25th ult., the Duke and Duchess of York visited Salford for the purpose of opening the new Technical Institute which has been erected by the Corporation of the Borough in Peel Park. The new school is Renaissance in style, of red brick, and is over 100 yards long. The building contains a large public hall, besides a number of class-rooms and lecture-rooms. Separate laboratories are devoted to each branch of study. A dining-room and library are also included in the building. The chief entrance, in the centre of the front, admits to a vestibule, which leads to a long corridor, extending the full length of the building. On the floors above there are similar corridors, on to which the class-rooms open. The class-rooms are lofty, and in many of them the seats are arranged in galleries. The photographic department is fitted with dark rooms and other necessary conveniences, and on the roof there is a platform for developing plates in the sun. There are two large boilers in the basement for supplying power to the spinning and weaving departments; and these are also utilised for heating and ventilating purposes. In regard to the ventilation, a small erection, like a kiosk, is placed about twenty yards from the building. This is the ventilation inlet; and it is connected with the basement by pipes, along which fresh air is drawn by means of fans. The air is purified by being passed through a wet screen. Part of it is then passed through a heated chamber, and the remainder through a cold one; and from there the air is propelled into all the rooms at will, so that by pulling a chain the temperature can be regulated to any degree that is desirable. The foul air is removed through ventilators below the breathing line three times an hour, and is carried along special channels to the ventilation shaft, where it is thrown out by means of vacuum fans. Chiefly the back part of the institution consists of two large halls. That on the first floor is fitted with a gallery which is estimated to seat 680 to 700 people. On the floor above there is a large apartment which will be used as a chemical laboratory. Along all the staircases is a tiled dado. It is estimated that the building and fittings will cost 70,900*l.* The architect is Mr. H. Lord, of Manchester, and the contractors are Messrs. Wilson & Toft.

RENOVATION OF ELLON FREE CHURCH, ABERDEEN.—The renovation of this church has just been completed. The whole of the interior of the building has been gutted out, with the exception of the gallery. The floors have been renewed, and the old seats have given place to seats of the most modern design, made of pitch pine. The large platform pulpit has been superseded by a small octagonal fronted pulpit of modern design. The choir enclosure is of moulded panel work, corresponding with the decorative moulding round the base of the pulpit. All the windows have been renewed with cathedral-tinted glass. A pitch pine dado, 4 ft. high, goes round the whole of the church. The staircase to the left of the gallery has been closed, and the space converted into a cloak-room. The church is to be heated with hot-water circulation, and a heating chamber has been built at the back, along with other conveniences. The contractors are:—Carpenter work, &c., Messrs. Auld, Ellon; painter work, Mr. Edward Copland, Aberdeen; and plumber work, Mr. A. B. Robertson, Aberdeen. The architect has been Mr. W. Kelly, Aberdeen.

CENTRAL RAILWAY STATION, NOTTINGHAM.—As the works of the Nottingham section of the Manchester, Sheffield, and Lincolnshire extension to London have progressed towards completion, speculation has been rife, says the *Nottingham Express*, as to the exact position and other particulars of the central station. A copy of the plan has recently been sent by the engineer, Mr. E. Parry, to the Nottingham Corporation. The station will extend along the east side of Mansfield-road, from near the south front of the tunnel at Woodborough-road, to the commencement of the tunnel under Thurland-street. Immediately the two sets of metals emerge from the tunnels on either side of the station they "fan out" by means of points, and become a web of fourteend instict sets of rails in the central portion of the station, six of these lines being for local trains. The main entrance to the station will be opposite the Mechanics' Hall. A considerable amount of property in Milton-street at this point will be acquired, and a large space will be cleared of buildings to form an open space or approach to the new station. In this recess will be provided a covered cab-way, which will form a shelter for passengers arriving and departing from the station. The booking-hall will be immediately within the outer gates, and on the same level as the street. From the booking hall a few steps lead on to a bridge which crosses the main line. The bridge will take passengers to a large central island platform, and upon this central platform the usual station buildings will be built. Four lines are provided for the accommodation of passenger traffic for trains going in either a northerly or southerly direction. A goods line runs outside the passenger train lines. A local passenger train service is provided for by docks at each end of the station, these cul-de-sacs being accessible from the large island platform into which they cut. There will be a horse and a carriage dock, and a platform for general market and other goods at either end of the station. As the arrangement of the station will necessitate the absorption of Charlotte-street, the Company propose making a new road, 40 ft. wide a little further north between Mansfield-road and York-street. From that point the road will be carried over the station upon a bridge, and will join a new road it is intended to construct on the east side of the station, afterwards meeting the existing Glasshouse-street. It is also proposed to put a new footbridge over the station in a direct line from Union-road into the Mansfield-road at the north end of the station. The main platform will be 1,150 ft. long, the greater part of which will be covered. Then the width of the station centrally, not including the booking hall, will be 250 ft. From the booking hall there will be a side entrance southwards leading to an hotel, which it is proposed to build opposite Burton-street. On the other side of the booking hall for the two Companies the parcels office will be situated. The property to be destroyed extends from Parliament-street to Woodborough-road for a width of from 250 ft. to 300 ft. This includes all the Nottingham Workhouse, and a lot of Corporation property, extending southward of the workhouse.

ISOLATION HOSPITAL, WATFORD. — A new Isolation Hospital has just been erected by the Watford Rural District Council in Hagden-lane. The whole of the site is enclosed by a brick wall. The administrative block is a building of three stories, situated on the left of the entrance, and comprises on the ground floor entrance, staircase and corridors, sitting-room for matron and nurses, dining-room, medical officer's room, dispensary, matron's store, two lavatories, &c., two side entrances for nurses, kitchen, &c. On the first landing is bath-room, &c., and on the upper floors bedrooms and a store-room, with a tank-room in the roof. The hospital proper consists of two ward blocks, each block comprising one ward for ten beds 60 ft. by 26 ft. by 13 ft. high, and one ward for six beds 36 ft. by 26 ft. by 13 ft. high. Between the wards is the entrance lobby and hall, linen store, and nurses' duty-room. There is also pantry, &c., and bath-room. At the extreme ends of the wards are the sink-rooms, closets and lavatories, fitted up with Hellyer's corbel wash-down closets and hospital sinks and Doulton's white lavatory slabs, all separated from wards by a cross ventilated lobby. The floors of both wards and duty-rooms are laid with Ebner's oak blocks on the "Hydrofuge" system, all waxed polished, and the floors of halls, lavatories, &c., with granite concrete. The whole of the walls and ceilings are finished with granite plaster painted, and all angles of walls, angles of walls and floors, and walls and ceilings are hollowed. The six-bedded wards are intended for men, and the ten-bedded wards for women and children. The Isolation block consists of two sections, each section being exactly similar but reversed, so that the entrance and verandah of one section faces south-east, and the other north-west. Each section comprises three wards, two for two beds each and one for one bed, with nurses' duty-room between the double-bedded wards with fixed sashes commanding a view of both. The whole of the wards are fitted with Messrs. Shortland Brothers' Manchester stoves and grates. Shorland's inlet ventilators are fixed under each bed, with exhaust ventilators on roof connected by zinc tubes to ceiling-hoppers, fitted with valves for opening and closing. Gas is laid on throughout. There are two discharging blocks, which are situated in the grounds quite detached. The laundry block is planned at the north-west part of the ground, and has been fitted by Bradford & Co.; the same firm have also provided the steam boiler and the "Washington Lyon" steam disinfector, which are placed in distinct buildings. In the rear of this block is the mortuary and inspection room, also coal store and engineer's workshop. The ambulance block is placed between the laundry and lodge. The whole of the buildings are erected in stock bricks, with red facings and gauged arches, and all roofs are boarded, felted, and slated. The following firms have executed portions of the work, as follows, viz.:—The Ellistown Company, pipes, coping, tiles, &c.; the Wood Block Flooring Company, pitch pine blocks; Mr. Dawnay, girders and other ironwork; Mr. W. T. Stainton, all kitcheners and domestic hot-water supply; the British Patent Glazing Company, verandah, roofs, &c; Macfarlane & Co., gutters and pipes; Emanuel's, Limited, cocks, valves, &c.; Bratt, Colbran, & Co., stoves and chimney pieces; Colledge & Bridgen, locks and fastenings; the Granite Plaster Company, all plastering throughout. Messrs. Andrews & Sons, of Watford, are the general contractors, their foreman in charge being Mr. Cox. The total contract, including road-making, &c., and boundary walls, amounted to 11,600*l.* The whole has been carried out under the superintendence of Mr. C. P. Ayres, of Watford, whose design was selected in competition; and Mr. H. G. Rogers, of St. Albans, has acted as clerk of works.

LEEDS GENERAL INFIRMARY, NEW OPERATING DEPARTMENT.—The old operating department of the Leeds General Infirmary having become somewhat antiquated, and out of date in its arrangements, it was decided some time ago to reconstruct it in accordance with the most modern ideas of surgical and medical science as applied to hospital construction, and in so doing to enlarge the area which the department previously covered. The new department, for which contracts have just been let, comprises the following accommodation:—A central hall or vestibule (an elongated octagon on plan), around which the various rooms are grouped, which are as follows: — Two operating theatres, each 23 ft. 6 in. by 19 ft. 6 in., with an instrument room, 16 ft. by 14 ft. 3 in., adjoining and opening out of each; two anæsthetic rooms, each 15 ft. 10 in. by 12 ft., opening into the operating theatres; two waiting-rooms, 14 ft. 3 in. by 12 ft., opening into the anæsthetic rooms; a surgeons' room, 10 ft. 6 in. by 9 ft. 5 in.; and a recovery room of similar size. Provision is thus made for two complete sets of operating and accessory rooms, admitting of two cases of operations being proceeded with at the same time. The two operating theatres are 18 ft. in height respectively, the floors and roofs being of fireproof construction composed of steel joists and Fawcett's tubular lintels and slag and coke breeze cement concrete. The roofs are rectangular on plan and domical in construction. The floors will be finished with marble terazzo, and the ceilings with Parian cement. The walls throughout will be lined with opaline, a vitreous material with a smooth glassy face $\frac{5}{8}$-in. thickness, in slabs about 5 ft. by 3 ft. square, and all angles are rounded. Galleries of skeleton iron construction, with teak treads and seat rests on either side of the theatres give accommodation for fifty-six students in each room respectively. In addition to extra large sized windows at the end of the areas used for operations, between the two galleries, top-lighting is obtained from the roofs. The rooms will be provided with all requisite lavatory basins, sinks, glass shelving, &c., and electricity will be made use of for artificial lighting, for operative purposes, and also for heating, sterilising cases of instruments, &c. The instrument room, which adjoins and opens out of each of the operating theatres, is both roof and side-lighted, with terazzo floor and opaline lined walls. The waiting and anæsthetic rooms are side-lighted and the walls will be finished with Parian cement. The entrance-hall, the recovery-room, and surgeons'-room are top-lighted with domed lantern lights, and the former is provided with a high dado of glazed tiles. All doors throughout the department will be carried out in polished teak, and the window frames will be executed in the same material. All windows are flush with the internal face of the walls and will be double glazed. Mellowes' patent glazing will be used for all roof-lights, and the roof flats will be finished on the fireproof roofing with Limmer asphalte. The department will be ventilated and warmed throughout on the plenum system, carried out by Mr. William Key, engineer, of Glasgow, the fresh air, filtered from impurities, being propelled into the various rooms by means of a fan in the basement. The opaline for wall linings will be provided by the St. Gobain Cie., Paris. The department will be lighted throughout by electricity. The total cost of the new department, including fittings, will amount to about £4,000. Contracts have recently been let to the following firms:—Mr. Isaac Gould, mason, brick, and joiner; Mr. T. E. Bedford, plumber and glazier; Messrs. Bagshaw & Sons, Batley, iron-founders; Mr. T. P. Mountain, plasterer; Messrs. Watson & Worsnop, slaters; Mr. George Hall, painter. The new department has been designed and is being carried out under the superintendence of Mr. William H. Thorp, architect, of Leeds.

NURSES' HOME, LONDON HOSPITAL, WHITECHAPEL.—A new nurses' home in connexion with the London Hospital, Whitechapel, is being erected in Mount-street, connected by a corridor on the ground floor with the old home. The building has been built of red bricks and stone dressings, and consists of eight floors. The ground floor is to be used as a sick ward for nurses, the dimensions being 48 ft. by 30 ft., and the upper floors will be used as dormitories. There will be fifteen bedrooms on each floor, and each room will be about 12 ft. 6 in. by 9 ft. Servants' offices will be situated in the basement, while the top floor will be used for nurses' lockers. The building will be lighted by gas, and

heated by hot-water pipes. A fire-escape staircase has been built, and a hand-lift provided by Messrs. Richmond & Co. The building is fireproof throughout, the floors, partitions, &c., being constructed by the Banks' Fireproof Construction Syndicate, and the granolithic stairs by Stuart's Granolithic Stone Co. The architect is Mr. Rowland Plumbe, the builder being Mr. W. Shepherd.

LYCHGATES, BAXTERLEY CHURCH.—Two lychgates are to be erected at this church (Warwickshire), as memorials to the late Vice-Chancellor Bacon; the larger one for the purpose of funerals, at the principal approach to the church, and a smaller one at the opposite side of the church for footpath entrance only. They are from the designs of Mr. A. Bickerdike, architect, (London).

NEW CHURCH, NORTHAMPTON.—The memorial-stone of the new Free Church at Northampton was laid recently by Lady Manfield. The chief features of the church are the red brick and Weldon stone gable front, and a stone ornamental turret. The front of the church proper shows an arched doorway, with a small window on either side, surmounted by a large six-light, arched window. The windows are filled with tinted glass. On the left side of this front is the stone turret, pierced by two or three small windows. The high pitched roof of the church is covered with green slates. The doorway opens into a small lobby the whole width of the building, leading, by a door at each end, into the church, and at one end to the gallery stairs. The gallery is over the lobby only. The pulpit and choir stalls are of oak. The open timbered roof is of pitch pine, with hammer-head beams. The seats are of pitch pine, and there is a dado of the same wood running all round the building. The walls above are plaster. There are three windows at the side, and a large one at the back. The interior dimensions of the church are 35½ ft. by 66 ft., providing accommodation, with the gallery, for 400 worshippers. At the front are a committee vestry, on the ground floor, and ladies' vestry above. These are on the north side of the lobby. The other end of the lobby gives entrance into the adjoining schoolroom. The architect is Mr. Charles Dorman, and the erection of the church and schools has been entrusted to Messrs. Green Bros.

SANITARY AND ENGINEERING NEWS.

SEWAGE WORKS, CHEADLE, CHESHIRE.—The sewage outfall works of Cheadle and Gatley have just been formally opened. The works, which have been carried out under the supervision of Mr. Edward Sykes, the Council's Engineer and Surveyor, cover between seven and eight acres, and are situate at Gatley. The system is one of precipitation and filtration. There are six precipitation tanks and eight filter chambers.

SOWERBY BRIDGE SEWAGE SCHEME.—The ceremony of the cutting of the first sod of the Sowerby Bridge new drainage scheme was performed at Milner Royd, on the 27th ult., by Councillor F. J. Scholefield. The system adopted is one of precipitation and filtration, the effluent being discharged into the Calder. The contractors for the works are:—Excavating, masonry, &c., Messrs. Garforth Bros., of Mirfield; iron pipes, ironwork, &c., the Staveley Iron Company, Chesterfield; earthenware pipes, &c., Messrs. Oates & Green, Limited, Halifax. Messrs. Utley & Gray, of Halifax, are the engineers to the scheme.

FOREIGN.

FRANCE.—The Government has just given commissions to a certain number of artists for pictures for the Sorbonne. M. Dubufe is to paint the ceiling of the central hall, M. Roll is to decorate the amphitheatre in the Physiology Hall, M. Lhermitte that in the Mathematical, and M. J. Ferry the Botanical Hall. M. Henner is to decorate the "*Salon des Autorités*," MM. Jules Lefebvre and Jean Paul Laurens the Library, M. Joseph Blanc the Professors' Gallery, and M. Léon Comerre the Archæological Amphitheatre.——The *Fontaine des Innocents*, which has some remarkable sculptures by Jean Goujon, and the *Fontaine du Châtelet*, decorated by Boizot, are about to be restored by M. Formigé, the architect.——MM. Benouville, Bruneau, and Chaîne, have just been elected on the jury in the architectural section of the Champ de Mars Salon.——Very shortly the town of Versailles will be entirely lit by electricity.——There has been a great fire in Lille, in which several lives have been lost, and some of the finest buildings have been destroyed: the Hospital Saint Sauveur, built 1216, and enlarged in 1698; the Noble tower, last vestige of the old walls of Lille, built in 1402, and the great church of Saint Sauveur, which was built in the fourteenth century. This latter building, which suffered from the fire of 1792, was built over an immense crypt, and had a steeple, the spire of which was 60 mètres high. The damage done by the fire is estimated at two millions.——Important works are being carried out at Cherbourg, the harbour is to be improved and the jetty lengthened.——A line of railway is shortly to be carried out from Vouziers to Raucourt (Ardennes), with a branch line from Chatillon-sur-Bar to Buzancy.——The Parliamentary Commission that has been appointed to examine the project for the making of a canal from Marseilles to the Rhône have adopted this project, with some modification of the line of direction between Arles and the Etang de Berre.——An iron bridge has just been thrown across the Seine for the railway from Montereau to Corbeil. This bridge, which is 142 mètres long, weighs 800,000 kilos.——The Municipal Council of Arles has decided upon building an ethnographical and artistic museum, which will contain all the specimens of costumes, jewellery, furniture, household implements, and objets d'art, ancient and modern, to be found in that part of the country.——M. Alfred Lenoir, sculptor, has just finished the model of the monument to Maréchal Canrobert, which is to be erected at St. Cére. The marshal is represented standing on a highly-decorated pedestal, at the feet of which are placed crowns with the names of the battles in which he distinguished himself. A soldier is lying near the crowns, and standing by is a figure in the dress of a Zouave.——The Sultan Abdul Hamid has presented the Louvre Museum with a beautiful silver vase. It is a piece of exquisite Chaldean silver work, one of the finest specimens of metal work in existence. The vase was discovered in 1888 by M. de Sarzec, in excavating the old town of Sirpoula, and presented to the Turkish Government.

MISCELLANEOUS.

BANKS' FIREPROOF SYSTEM.—An opportunity was afforded on Friday last week of inspecting the extensive work of fireproof construction now being carried out by the Banks' Fireproof Construction Syndicate, at the new Nurses' Home in connexion with the London Hospital, Whitechapel. The construction to be seen consisted of fireproof floors, partition walls, and suspended ceilings under wood rafters, and the work had been left in various stages of completion to facilitate inspection. In the case of the floors the fire-resisting obstacle is a suspended fireproof ceiling, made of helical metal-lathing, coated with "Etna" plaster. The metal-lathing, which is formed of steel ribbons twisted and woven, is attached by patent hook-fasteners to light iron ceiling-bars, which take the place of the wood rafters. Between the ceiling and the joists of the floor is a clear space of 2½ in., and it is claimed that so long as the ceiling remains intact this air-space will afford protection to the floor above. Seeing that the constructive iron or woodwork of a floor would not be reached by flames in the event of a fire, provided the suspended ceiling proved absolutely fireproof, the system has much to recommend it theoretically—and practically also, so far as the successful experiments carried out in 1894 can be relied upon. The inventor also claims for the system that it is light, and also sound-proof. Further particulars of the system, together with diagrams, will be found in our issue for November 3, 1894.

LIVERPOOL PUBLIC IMPROVEMENTS.—The Parks, Gardens, and Improvement Committee of the Liverpool Corporation have recently considered a plan which has been prepared by the City Surveyor (Mr. Shelmerdine), designed to deal with the improvement of roadways and approaches towards Dale-street and Manchester-street, and the utilisation for this purpose of the land connected with St. George's Hall and the public buildings which belong to the group of which it is the centre. It is understood that the Surveyor's scheme leaves John's-lane practically as it is. The wall of the churchyard will form the outer boundary of a new road, which is proposed to be 60 ft. in width. The width of William Brown-street will be reduced from 65 ft. to 60 ft., a small longitudinal piece of the existing plateau of the Free Library and Museum being taken away. A new road will be made which will take off part of the present gardens on this side, and will stretch from the north end of St. George's Hall to the Old Haymarket, with a width of 60 ft. The Old Haymarket will be spanned by a bridge, and from this point a new road will run into Dale-street, having a width of 75 ft. At present the difference between the level of the north end of the gardens and that of the point where the new roads will converge is 40 ft. It was resolved "That, in the opinion of this committee, it would greatly facilitate traffic and be an improvement to the city if a high level roadway were constructed from the corner of Manchester-street and Dale-street, across the Old Haymarket, and then to branch off and terminate near the north and south ends of St. George's Hall, as shown upon the plan now submitted by the Surveyor, and that such a scheme should be carried out if such of the property between Manchester-street, Dale-street, and the Old Haymarket as may be required for the improvement can be acquired at a reasonable price; and that the Council be recommended to authorise the Parks, Gardens, and Improvement Committee to ascertain and report to the Council the probable cost of acquiring the property, and to submit estimates of the probable cost of carrying out the improvement." It was also resolved "That the Surveyor cause a model to be prepared showing the scheme proposed by him."

UNDERGROUND CONVENIENCES.—Messrs. B. Finch & Co. have just completed two underground conveniences. The one situate at the corner of Coldharbour-lane, Brixton, entirely carried out by themselves, contains on the men's side ten urinals, four water-closets, two lavatories, and on the women's side four water-closets and three lavatories; the other one is built by the Camberwell Vestry, in which Messrs. Finch have fixed similar accommodation on a rather larger scale. The closets used were their patent siphonic, the urinals circular backed, and the marble selected rouge royal marble.

EXTENSION OF THE ELECTRIC LIGHTING OF GLASGOW.—The Electric Lighting Committee of the Corporation met on the 24th ult., when it was agreed that the official of the committee should consider the question of the extended lighting of the city by electricity, and also investigate into the relative merits of gas lighting as compared with incandescent electric lighting for use in the subsidiary streets. The committee felt on the whole question of the electric lighting of the streets that the effect of the Corporation having been comparatively early in the field was that they were suffering from many initiatory blunders that had been made, and that in carrying out further improvements they would profit by the experience they had gained.

GLASTONBURY ABBEY.—It will be learnt with general interest, and with especial gratification by archæologists, that the new owner of what remains of this once famous Benedictine abbey intends to take immediate steps to arrest its further decay. Mr. Hanley Austin, who has just come into possession of the abbey by inheritance, has called in Mr. Edmund Buckle, the Bath and Wells Diocesan architect, to see what can be done to preserve the ruins from further dilapidation. Speaking on this subject, Mr. Alderman Bulleid, President of the Glastonbury Archæological Society, said he was very glad to hear that Mr. Buckle had been called in and instructed to prepare plans for such work as might be necessary for the proper preservation of the crypt of the abbey. He had felt great regret for many years past to see how portions of the abbey were falling into decay. In the future means would be taken to keep the ruins in a better state than in the past.—*Times*.

FOREIGN-MADE JOINERY.—At the recent quarterly meeting of the Bristol 1st Branch of the Amalgamated Society of Carpenters and Joiners the following resolution was agreed to:—"That this branch views with deep regret the decision recently come to by the Barton Regis Board of Guardians, *re* a resolution submitted by Mr. H. Brabham, concerning the use of foreign-made joinery in the buildings under construction by that Board. We are of opinion, as ratepayers in the Barton Regis and Bristol Unions, that consideration should be given to the unemployed of this city, in the place of joinery work being imported from the Continent or elsewhere, especially at a time when that Board were applying to the Bristol Sanitary Authority for work for the unemployed. We further consider that the fair-wage clause containing the rate of wages to be paid, hours of labour, and conditions to be observed, should be invited in all contracts when necessary for the Board to employ contractors, and should be enforced under a penalty. Lastly, we consider it an injustice to ratepayers that they should be compelled to pay poor-rates while work is being imported from abroad, so as to allow the contractor to extract a greater amount of surplus value from us as ratepayers."

CARDIFF ELECTRIC LIGHTING.—On the 26th ult., Mr. G. Wilcocks, M.Inst.C.E., Local Government Inspector, held an inquiry in the Town Hall, Cardiff, respecting the application by the Cardiff Corporation to borrow 12,500*l.* for the extension of the public electric lighting. There were in attendance Mr. J. L. Wheatly (town clerk), Mr. W. Harpur (Borough Engineer), and Mr. Appleby (electrical engineer). The Town Clerk explained that the town and population of Cardiff had rapidly increased and were increasing, that the Corporation had already borrowed 45,385*l.* for electric lighting, and that the further sum of 12,500*l.* was required for additional engines, boilers, and other plant, additions to the electric lighting station, and extension of the mains. The Borough Engineer also gave evidence, and said that they were supplying 10,000 eight-candle power lamps, and application had been received for 2,500 more, which they could not supply because they had not the power. The proposed outlay would provide for an additional 10,000 eight-candle power lamps. Mr. Appleby also gave evidence as to what would be required. There was no opposition.

ELECTRIC LIGHTING, HAMMERSMITH.—At the ordinary fortnightly meeting of the Hammersmith Vestry, on the 18th ult., at the Broadway Lecture Hall, Hammersmith, the Electric Lighting Committee stated that they had obtained the assistance of Mr. A. H. Preece, who prepared a full report showing that the system of electric lighting best adapted to the requirements of the parish was the alternating current transformer system, and that Messrs. Siemens' tender was the lowest, but that for several reasons it would be more economical to adopt Messrs. Ferranti's system, and recommended that both firms should be invited to submit revised tenders for complete station plant, leaving the mains to be dealt with later. These tenders were sent in,

and Mr. Preece recommended that of Messrs. Ferranti, as being most economical. The Committee recommended that this tender—12,302*l.* 12s.—be accepted, subject to their guaranteeing the efficiencies of their plant, under a penalty at the rate of 200*l.* for every 1 per cent. less in the efficiencies so guaranteed. This was agreed to.

BUILDING TRADES' ASSOCIATION, IPSWICH.—The annual dinner of this association was held on the 26th ult., at the "Crown and Anchor" Hotel, the chair being taken by the President, Mr. Charles Borrett. The vice-chair was filled by Mr. Councillor E. Catchpole. The toasts of "The Town and Trade of Ipswich" and of "Kindred Associations" having been proposed and responded to, Mr. R. Girling, jun., gave "The Building Trades' Association," and commended the objects of the Society to those who still held aloof. It was not founded to resist just claims of workmen, but to resist tyrannical pressure being put on individuals. Mr. T. Parkington, jun., gave "The Chairman and past officers," especially mentioning the valuable services of the Secretary (Mr. W. Grayston), who is about to relinquish the duties after many years of office. Messrs. Borrett, Catchpole, and Grayston responded.

THE SIZE OF BRICKS.—The variation in the sizes of bricks made by different firms often leads to a great deal of inconvenience and useless labour and expense. The introduction of pressed bricks or terra-cotta bricks among common moulded bricks is often prevented because of the unequality of sizes—the pressed brick generally being much smaller than the moulded ones—and this militates against the interests of pressed brick makers, for, if moulded and pressed bricks were of one uniform size throughout the country, the use of pressed bricks for trimming windows, doors and other openings, would soon become a fixed practice in the smaller towns, villages and country, and the practice has much to commend it from more points of view than the artistic one. It seems to us that it would be as much within the scope of parliamentary limits, to legislate on the question of "uniformity of size in bricks," as it is to legislate on "weights and measures," and the rights of the community are nearly as much concerned in one as in the other.—*Canadian Architect.*

THE BUILDING TRADE IN BIRMINGHAM.—The building trades of Birmingham were never in so active a state as at the present time, says the Birmingham *Weekly Post*. There has been no frost or snow during the past winter, and no long spell of wet weather to interfere with building operations, and there is now no prospect of such interference for the next eight or nine months. Consequently bricklayers, and carpenters, and plasterers have had an extraordinary run of luck. At the present rate of progress, we may expect to hear of a scheme for a still greater Birmingham before very long. Houses are being built in every direction.

GLASGOW BUILDING TRADES' EXCHANGE.—A paper entitled "Specifications" was read by Mr. James Goldie, builder, before the members of the Glasgow Building Trades' Exchange on the 27th ult. Colonel Bennett presided. The lecturer held that of the three indispensable things with which a contractor must be furnished in order to tender satisfactorily—viz., plans, specifications, and bills of quantities—that the specification was the most important, and it should never require alteration. He condemned as contemptible a clause in a City Improvement Trust schedule, where an endeavour was made to saddle contractors with the cost of restoring work destroyed by storm or other circumstances beyond their control, the responsibility, as laid down by the Court of Session, lying with the proprietors. He doubted if the interference of the Building Trades' Exchange in the matter of adherence to specifications would be judicious. A better work would be to get specifications more carefully framed—to get it made a document explanatory of what the contract included, and not a riddle; to make it clear, decided, explicit in language, and free from ambiguity.

A WELL-MERITED TESTIMONIAL.—A committee has been formed to present Mr. George Knottesford Fortescue, the late superintendent of the Reading Room of the British Museum, with an illuminated address expressive of the readers' hearty appreciation of the ability and courtesy which he manifested in the performance of the duties of his office during the past eleven years, and also of the important service he has rendered to students by the compilation of the "Subject Catalogue," a work of no little magnitude, involving considerable labour and care. The committee would be very glad if any of the readers who are disposed to contribute a small sum towards this purpose, not exceeding 2s. 6d., would kindly give it to the treasurer or any member of the committee; or send it to the honorary secretary, at his private address, 182, Haverstock Hill, Hampstead. So many students have been indebted to the courtesy and kindness of the leading officials at the Reading Room, that we can have no doubt there will be a large response to this appeal.

GLASGOW INSTITUTE OF ARCHITECTS. — A quarterly general meeting of this Institute was held in the rooms, 187, Pitt-street, on Thursday last week, Mr. T. L. Watson, President, in the chair. It was reported that an exhibition of the prize drawings of the Royal Institute of British Architects would be held in the rooms during the week commencing April 19, and also that the Council had agreed to take charge of the Intermediate examination for Associates to be held in Glasgow on June 16, 17, 18, and 19 next, provided not less than twelve candidates from Scotland presented themselves. It was further reported that, as a result of the negotiations with the architectural section of the Philosophical Society, on behalf of the Glasgow Architectural Association, who occupy the rooms jointly with this Institute, the society had resolved to make a donation of 20*l.* to the Association, to be used in the purchase of books for the library, and the secretary was instructed to send a letter to the Philosophical Society thanking them for the encouragement which they had thus given to the Association. After some discussion as to further additions to be made to the library, the meeting separated.

CAPITAL AND LABOUR.

LOCK-OUT OF BRICKLAYERS AND PLASTERERS, NEWCASTLE.—On the 27th ult. the master builders of Newcastle and Gateshead decided to lock out the bricklayers and plasterers, pending the settlement of the dispute between those two bodies of workmen, who have quarrelled as to whose duty it is to lay cement.

LABOUR MEETING AT COLCHESTER.—A meeting, under the auspices of the Colchester Branch of the National Union of Gasworkers and General Labourers, was held in Colchester High-street on the 28th ult. Mr. Pete Curran said that the wages in the building trade, especially for hod-men, scaffolders, and pipelayers was, in Colchester, about the smallest he knew of for a town of the size. The wages for hod-men, scaffolders, and pipelayers in Colchester ranged from 4d. to 4½d. per hour. The difference as compared with the wages in London was due to two things—first, to the fact that there was organisation in London, and want of it in Colchester; and secondly, because in London the building trades were federated. In Colchester there were considerably over 200 labourers connected with the building trade, and something like 65 belonging to that Union.

LEGAL.

A PARTY WALL DISPUTE.

THE case of the Aërated Bread Company *v.* Shepperd came before Mr. Justice North in the Chancery Division, on the 27th ult., it being a case which had been before his lordship on a previous occasion on motion. It was alleged that the defendant, Mr. Wm. Shepperd, had interfered with the plaintiffs' rights to a party wall at their shop in Cheapside, by making certain alterations to his premises adjoining. The motion stood over, and since then an award had been made.

Mr. Swinfen Eady, Q.C., on behalf of the plaintiffs, now said that the defendant had committed a breach of the undertaking which he gave by saying that he would not build otherwise than in accordance with the award. The present notice of motion asked for the committal of the defendant for the alleged breach.

After some discussion between Mr. Eady and Mr. Vernon Smith, Q.C. (counsel for the defendant), it was arranged that the motion should stand till the trial.

A LIGHT AND AIR CASE.

MR. VERNON SMITH, Q.C., mentioned the case of Woodhead and others *v.* McDonough to Mr. Justice North, in the Chancery Division, on the 27th ult. The learned counsel said it was a light and air motion, and it had been arranged to let it stand over till the first motion day next sittings. According to the notice of motion, the plaintiffs alleged that the defendant was erecting buildings at his premises, the "Sir Robert Peel" public-house, Bradford, so as to interfere with the plaintiffs' ancient lights, and the plaintiffs seek an injunction to restrain the defendant from erecting or permitting to be erected any building so as to darken, injure, or obstruct any ancient lights enjoyed by the plaintiffs.

LICENSED VICTUALLERS' ASYLUM *v.* DRYSDALE BROTHERS.

IN the Chancery Division, on the 20th ult., before Mr. Justice Kekewich, the Licensed Victuallers' Asylum sought and obtained an injunction to restrain Messrs. Drysdale Brothers from erecting a warehouse adjacent to the Asylum in such a manner as to obstruct the plaintiffs' light.

Mr. Renshaw, Q.C., and Mr. Frederic Thompson (instructed by Messrs. H. J. & T. Child, solicitors to the Asylum) stated that an order had been agreed upon between the parties which the Court was now asked to sanction. On several occasions previously the matter had been mentioned, and adjournments had been taken from time to time to enable an arrangement to be made as to the carrying out of the buildings now being erected by the defendants, Messrs. Drysdale Brothers, adjacent to the plaintiffs' Asylum, Asylum-road, Old Kent-road. The defendants were lessees of a piece of ground on which they were erecting a warehouse of considerable height, opposite the Smalley wing of the Asylum. It had now been arranged that a final order should be taken by consent, restraining the defendants from putting up on a certain portion of their land (shown on plan) any buildings or erections, and from carrying up other portions of their buildings (shown on elevations) above an angle of 45 deg. from the sills of the lowest windows of the houses Nos. 165 to 173, in the Smalley wing of the plaintiffs' institution, and extending along the whole length of the northern side, in the direction mentioned. Further, the defendants undertook that the portions of the wall facing the Smalley wing, and rising above the plaintiffs' boundary-wall, should, when erected, be faced with white glazed bricks, and should be so maintained. Finally, the defendants were to pay 240*l.* as the agreed costs of the plaintiffs, and on these terms all further proceedings in the action should be stayed.

Mr. Rowden appeared for the defendants, and assented.

His lordship gave judgment by consent, according to the minutes of order prepared by the parties.

The architects engaged in this case were Messrs. T. Roger Smith, Banister Fletcher, W. F. Potter, and F. J. Eedle, for the plaintiffs; and Messrs. E. B. I'Anson and Waring & Nicholson for the defendants.

LONDON BUILDING ACT, 1894:

TRIBUNAL OF APPEAL.

A MEETING of the Tribunal of Appeal took place recently at the Surveyors' Institution, Mr. Arthur Cates (Chairman), Mr. J. W. Penfold, and Mr. Alfred A. Hudson being present, with the clerk, Mr. C. H. Love.

A case of considerable importance to surveyors and architects was considered, raising practically the question as to the construction of Section 43 of the Act.

Mr. Thomas Boyce, of 8, Hart-street, Bloomsbury, the builder and building owner of 56, Charlotte-street, appealed under Section 43, Sub-Section 3, on the following facts. He had given notice to the District Surveyor for West St. Pancras, Mr. Frederick Wallen, of 96, Gower-street, on January 31, 1896, of his intention to rebuild the premises, 56, Charlotte-street. The plans were approved by the District Surveyor, on January 2, of a previously existing building, in accordance with Section 43. On February 28, however, Mr. Wallen served a notice on Mr. Boyce, stating that the building would deviate from the plans certified by him, because of its height, and that the sanction of the London County Council to such deviation had not been applied for or obtained. The contention was now raised as to the meaning of the word "plans" in the section.

The Tribunal determined that the intended domestic building did not deviate in any respect from the plan or plans of the previously existing building certified by the District Surveyor, so that more land will be occupied by the newly-erected building than was occupied before, and they consequently allowed the appeal, and made no order as to costs.—*Estates Gazette.*

MEETINGS.

SATURDAY, APRIL 4.

Sanitary Inspectors' Association.—Mr. T. G. Dee on "The Impurities of Water; their origin and detection,' with chemical demonstrations. 6 p.m.

TUESDAY, APRIL 7.

Carlisle Architectural, Engineering, and Surveying Society.—Mr. R. G. Rogerson on "Setting out Railway Curves."

WEDNESDAY, APRIL 8.

Institution of Civil Engineers (Students' Visit).—To inspect the works of the Waterloo and City Railway. (Assemble at 15, Upper Ground-street, Blackfriars.) 2.30 p.m.

Edinburgh Architectural Association.—Mr. J. Clark on "A Tour to Rome." 8 p.m.

THURSDAY, APRIL 9.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. Wright Clarke on "Details of Plumbers' Work. 8 p.m.

SATURDAY, APRIL 11.

Sanitary Institute (Lectures for Sanitary Officers).—Inspection and Demonstration at Beddington Sewage Farm, Croydon.

Edinburgh Architectural Association.—Visit to (1) Pitreavie House, (2) Dunfermline.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

3,456.—BURNERS FOR SOLDERING IRONS, &c.: *W. Pullen.*—This invention relates to a form of vapour burner, adapted for use with hydro-carbon fuel, preferably naphtha or benzaline, arranged to communicate intense heat to the copper bit of the soldering-iron. The containing vessel for the fuel may form part of the handle of the soldering-iron The invention can also be utilised as a painter's torch for burning off paint, or as a lead burner.

5,014.—WINDOW LIFTS AND CARRIAGE-WINDOWS: *R. Hyde.*—The patentee arranges a lock (having a pivoted ever and spring) and makes suitable connections to secure

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered.
Street Works Scheme, Ashton-under-Lyne	Hurst U.D.C.	.....	April 9
Waiting Room, Lavatories, &c. St. Augustine Bridge	Bristol Corp.	50 Guineas	May 1
*School	Alderahot S.B.	2½ per cent. on accepted contract	May 4
*Covered Approach	Southend Corporation	20l. 15l. and 10l.	June 1
*Infectious Diseases Hospital	Skipton U. & R.D.C.	20l. 10l. and 5l.	July 1

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c. Supplied by	Tenders to be delivered.
Alterations, &c. Schools	Pontypool County Girl's School	B. Lawrence, Archt. Austin Friars-chamb. Newport, Mon.	April 7
Additions, &c. Two Houses, South Clough-lane, Lynn, Norfolk	Exors. of R. Brooks	W. Jarvis, jun. Archt. Market-place, Lynn	do.
Stone (Hartshill)	Banbury Town Council	N. H. Dawson, Boro' Surv. Town Hall	do
Three Wrought-iron Bridges, Ynyslas, Carfan, Lledrod	Cardigan C.C.	R. Lloyd, County Surv. Tregaron	do.
Weights and Measures' Office, &c.	Stockport Corp.	John Atkinson, C.E. Boro' Surveyor	do.
Ironwork, Widening Bridge	Pontypridd U.D.C.	E. Rees, Surv. Council Offices	April 8
Sewage Works	Pudsey (Yorks) U.D.C.	R. W. Cass, Surv. Council Offices	do.
Business Premises and Cottages, Tweedmouth	Tweedside Indus. Co-op. Soc. Lim.	Secretary, Main-street, Tweedmouth	do.
Additions to Offices, Fairfield-road, Bow, E.	Poplar Union	G. E. Holman, Archt. 109, Bow-road, E.	do.
Post Office, Southport	Com. of H.M. Works	Secretary, 12 Whitehall-place, S.W.	April 9
Weighbridge, House, &c. Portwood Works	Stockport Corp.	S. Meunier, Engr. Millgate Gasworks, Stockport	do.
Blue Stone and Slag	Pocklington (Yorks) R.D.C.	Thos. Robson, Clerk, Offices	April 10
Post Office, Battersea, S.W.	Com. of H.M. Works	Secretary, 12, Whitehall-place, S.W.	do.
Buildings for Gas Plant, Bradford-road	Manchester Corp.	C. Nickson, Town Hall	do.
Tar-paving, Portsmouth-road	Southampton Corp.	W. B. G. Bennett, Boro. Engineer	do.
Stabling, &c. Sewage Farm, Hillam-lane, Urmston	Moss Side (Lancs) U.D.C.	W. R. Aston, C.E. Council Offices, Moss Lane East	April 11
School	Wellington (Hereford) Sch. Bd.	E. G. Davies, Archt. 6, St. John's-street, Hereford	April 13
Gasholder	Hindley (Lancs) U.D.C.	Mr. Dickinson, Gas Manager, Hindley	do.
Tar-paving	Wanstead School Bd.	J. T. Bressey, Surv. 70 & 71, Bishopsgate-st. Within	do.
Road Materials	King's Lynn Corp.	E. J. Silcock, C.E. Boro' Surveyor	do.
*Repairs, Painting, &c.	Central London Sick Asylum District	W. S. Cross, 18, Outer Temple, W.C.	do.
Granite and Slag	Long Sutton (Lincs) U.D.C.	S. S. Mossop, Clerk, Offices	do.
*Kerbing, Channelling, &c.	Hendon U.D.C.	S. S. Grimley, Public Offices, The Burroughs, Hendon	do.
Refreshment Rooms, Royal Pier	Southampton Harbour Board	E. C. Poole, C.E. 2, Portland-st. Southampton	April 14
*Gravel, Flint, Granite, &c.	Southall Norwood U.D.C.	H. R. Filkin, Council Offices, Southall	do.
*Three Water Vans	West Ham C.C.	L. Angell, Town Hall, Stratford, E.	do.
*Paving	do.	do.	do.
*Paving Footways	Greenwich Bd. of Wks	141, Greenwich-road, S.E.	April 15

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c. Supplied by	Tenders to be delivered.
*Bass Brooms	St. Saviour's B. of W.	G. R. Norrish, Offices, Emerson-street, S.E.	April 15
*Granite Cubes and Wood Blocks	do.	do.	do.
*Shoot for Dust Refuse, &c.	do.	The Clerk, Offices, Emerson-street, S.E.	do.
*Block of Latrines at Workhouse	West Ham Union	Clerk's Office, Lewtonstone	do.
Admiralty Buildings (Block No. 2), St. James-park, S.W.	Com. of H.M. Works	Secretary, 12, Whitehall-place, S.W.	April 16
*Construction of New Museum for Egyptian Antiquities	Egyptian Government	Offices of the "Service Administratif"	April 18
*Additions to Hospital	Metropolitan Asylums Board	A. & C. Harston, 15, Leaden-hall-street, E.C.	April 20
*Construction of Sewer	Lewisham Bd. of Wks	Surveyor's Offices, Catford, S.E.	April 21
*Furniture for Schools	East Ham Sch Bd.	R. L. Curtis, 120, London Wall, E.C.	April 27
*Additions, &c. to Chapel	Plough Congregational Church, Brecon	104, Street Brecon	April
*Construction of Arabic Museum and Khedivial Library, Cairo	Egyptian Government	Offices of the "Service Administratif"	May 2
*Fever Hospital	Metropolitan Asylums Board	A. H. Tiltman, 6, John-street, Bedford-row, W.C.	May 4
Business Premises, Leeds	New Briggate Arcade Co.	Smith & Tweedale, Archt. 12, South Parade, Leeds	No date
Schools	Littleborough (Lancs.) Sch. Bd.	Butterworth & Duncan, Archt South Parade, Rochdale	do.
*Bank Premises	Mercantile Bank of Lancashire, Lim.	J. Gibbons Sankey, 104, King-street, Manchester	do.
*Warehouse	Tootal, Broadhurst, Lee, & Co.	do.	do.
Additions, &c. to Cemetery Tavern, Woodhouse-lane, Leeds	Mr. Dale	W. Wynn, C.E. 10, Livingstone-road, Roundhay-road, Leeds	do
Two Houses, Ripon-road, Harrogate	Mr. Charles	H. E. & A. Bown, Archts. Harrogate	do.
Alterations to Premises, Otley-road, Headingley, Leeds	Mr. Rayton	T. B Wilson, Archt. 12, East Parade, Leeds	do.
Roads and Drainage, Grange Estate, Skipton-road	Harrogate, &c. Co-op. Soc. Lim.	H. E. & Bown, Archts. Harrogate	do.
Twelve Houses, Shepshed, Leics.	Co-op. Society	W. T. Hampton, Archt. Coalville	do.
House, Borough Bridge, Harrogate	Mr. Green	T. E. Marshall, Archt. Princes-street, Harrogate	do.
School	Matlock Sch. Bd.	J. Sladen, Clerk, Offices	do.
Three Houses, Middleton	.....	W. E. Richardson, Archt. 28, Bond-street, Leeds	do.
Boring, Headingley, Leeds	.....	C Stott, Hall-lane, Armley	do.
Wall, Bishop-street, Londonderry	.....	John Ferguson, 20, London-street, Londonderry	do.
Five Cottages, Star-lane, Peterborough	.....	Mr. Meadwell, Durham Ox, Star-lane	do.
Four Small Houses, Holbeck, Leeds	.....	W. Farndale, Moorside, Holbeck	do.
Alterations, &c. to St. Mary's Schools, King's Winford, Dudley	.....	H. Phillips, at the schools	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in
*Inspector of Nuisances, &c.	Stratford and Wolverton R.D.C.	150l. per annum	April 7
Surveyor and Inspector	Stony Stratford, &c. R.D.C.	150l.	do.
Clerk of Works	Abertillery (Mon.) U.D.C.	2l. 10s. per week	April 18
*Assistant	Guildford Corporation	3l. per week	No date

Those marked with an asterisk (*) are advertised in this Number. *Competitions, p.* iv. *Contracts, pp.* iv., vi., *& viii.* *Public Appointments, pp.* xviii. *& xx.*

the window-lift and draught excluder bar (as shown in Specification No. 13,182, 1891) to the window-frame, which slides up and down in a railway-carriage or cab, &c.

7,690.—SIPHONS FOR CISTERNS: *D. Richmond.*—In order to dispense with rubber and other sucker valves in siphons for water-closets and cisterns, the cistern is fitted with a discharge siphon-pipe, extending to above the top level of the water, and then having a limb turned round and bent down to near the bottom of the cistern. Another limb, taken from the discharge-pipe at a point below high-level water mark is turned, and extends some distance up, where it has an open end. A cylindrical air-vessel is arranged to move over open-ended T-siphon limb, with usual chain. In the action when the air-vessel is pulled up, siphon action will be started, and the outflow of water will continue through both limbs till the cistern is emptied.

7,760.—WATER-FLUSHING CISTERNS: *E. Howl and Another.*—The object of this invention is to provide an effective method of regulating the discharge of water, &c. To effect this the upper end of the discharge-pipe is covered with a bell-shaped hood, the latter being mounted on a pivoted lever, to the other end of which the pull chain is attached. Normally, the hood rests on the bottom of the cistern, and covers the discharge-pipe orifice. When it is raised by the action of the pull chain, the water rises in the hood above the mouth of the pipe through the atmospheric pressure, and flows down it.

9,210.—SLAG CEMENTS: *S. Jörgensen.*—In order to cause slag cements to set more readily, the inventor mixes with them a proportion of his own improved slag cement, which consists of slag cement especially roasted and ground to a fine powder.

21,293.—CEMENT IN PLASTER COMPOUNDS: *F. W. Golby.*—Relates to a cement or plaster compound especially adapted for moulding, consisting of gypsum pulp, cement pulp, or other plaster prepared with a binding stuff such as water or glue, or similar compounds, to which the patentee adds a large proportion of cocoa-nut fibre.

24,263.—SUBSTITUTE FOR WINDOW GLASS: *J. Badon.*—This invention relates to a new product, which the inventor terms "Rideau vitre," and which is a transparent curtain, composed of a wide-meshed fabric, such as tulle, muslin, or wire gauze, coated with a gelatinous proportion of any substance rendered insoluble by the bichromates of potassium, &c., by the action of light.

24.—VENTILATING AND AIR MOISTENING: *C. Buchmüller.*—This invention has for its object the supplying of fresh moist air and carrying off dry used-up air from workrooms, &c., by means of a wheel furnished on a periphery with "paddles" or fans. These are directed at an acute angle to the radius of the wheels. The latter revolves in a metal chamber fitted with ingress and egress opening. A nozzle carries steam or vaporised water into the chamber wherewith the air becomes saturated.

1,766.—DOOR KNOCKERS: *A. Culpin.*—This invention consists of a knocker combined with a frame for the reception of one or more blocks or plates bearing the required number or other distinguishing feature, in such a manner that the latter can be altered as required, and the whole secured in position at one operation.

NEW APPLICATIONS FOR LETTERS PATENT.

MARCH 16.—5,832, A. Postlethwaite, Automatic Self-locking Waste-preventing Tap and Cock.—5,864, C. Bossen and A. Burghardt, Draught Excluders.

MARCH 17.—5,877, A. Bourne, Sash Pocket Chisel.—5,900, J. Hargreaves, Chimney-pots, Ventilators, &c.—5,904, R. Brown, Automatic Locking and Adjustable Sash Balance.—5,945, F. Drearie, Apparatus for Cleaning Gullies.—5,991, C. Horton, Fencing, Railings, Gates, and Roofing, and Portable Buildings.—5,994, E. Codling, Joints of Pipe Sewers, Drains, &c.

MARCH 18.—6,015, J. Green and W. Oates, Waste Water-closets.—6,021, T. Hill, Fire-grates.—6,045, W. Keen, Mortise Bolts.

MARCH 19.—6,105, F. Lynde, Syphon-flushing cisterns or Syphons.—6,107, H. Askew, Door-knob or Knob with Spindle complete.—6,169, M. Lander, Chimneys, Ventilators, &c.

MARCH 20.—6,217, J. Jones and H. Price, Syphon-flushing Cisterns or Water Waste Preventers.—6,224, L. Wilson and W. Brunning, Screw-socketed Drain-pipe.

MARCH 21.—6,258, W. Webster, Syphon Water Waste Preventer.—6,271, J. Forsythe and W. Stanley, Tool for grooving, tonguing, halving, and similar woodwork.—6,288, W. Johnson, Sliding Pivoted Window-sashes.—6,293, J. Sherwin, Die for the Manufacture of Tiles.—6,330 P. Jensen, Scaffolds for Buildings.

PROVISIONAL SPECIFICATIONS ACCEPTED.

1,525, J. Day, Water-closets.—2,961, A. Smith Band-sawing and other Machines.—3,033, The Pneumatic Painting Machine (1895) Corporation, Limited, and H. Crunden, Appliances for Spraying Oil Paint, Varnish, &c., upon Surfaces.—3,466, J. Duckett & Son, Limited, and J. Bullock, Machinery used in the Casting of Jointing Material on Stoneware or other Pipes.—3,747, T. Holcroft & Sons, Limited, and A. Mould, Waste-preventing Flushing Apparatus.—3,790, B. Falk, Clamp.—3,828, J. Connor, Hip and Valley Tile Angle Finder.—3,972, S. Neffgen, Artificial Stone.—4,863, B. Wagstaff, Flushing Cisterns.—4,173, R. Thompson, Inspection Chambers for Drains.—6,218, J. Bonehill, Cowl or Chimney Pipe.—4,474, A. Metcalfe and J. Morrison, Fans for Ventilation, &c.—4,602, J. Holroyd and R. Bond, Facing Tiles, &c.—4,892, J. Main, Built Columns, Beams, and Girders.—5,312, H. Board, Glazing or Covering of Horticultural Houses and Other Surfaces.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

9,904, J. Carroll and J. McDonnell, Ridge Tiles.—22,145, A. Stephens, Ventilators and Grates.

SOME RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

March 16.—By THOMPSON & WOOD (at Great Grimsby)

Waltham, Lincs.—"Little's Close," 12 a. 3r. 0 p., f. £280

Tetney, Lincs.—"Raffa Holme Close," 14 a. 1r. 16 p., f. 700

By J. J. O'CONNOR & SON (at Killarney).

Killarney, Ireland.—"Spillan's Hotel," u.t. 431 yrs., g.r. 12l. 780

March 17.—By J. MOSDELL (on the Premises).

Warblington, Hants.—"Lymbourne Lodge," u.t. 897 yrs., g.r. 1l. 1,470

By MORGAN & BAINES (at Sutton).

Sutton, Surrey.—Cressingham-grove, "Hillwood," f., r. 55l. 700

March 18.—By N. EASTON & SON (at Hull).

Hull, Yorks.—Cleveland-st., freehold factory and warehouse, area 1,935 yards 1,050

3, Granville-ter., f., r. 30l. 570

25, Woodcock-st., f. 265

Beverley, Yorks.—Seven enclosures of freehold land, 26½ acres 1,900

By C. R. BRADY (at Whaley Bridge).

Whaley Bridge, Cheshire.—"The Jodrell Arms Hotel," u.t. 999 yrs., g.r. 15l. 2,600

By THOMPSON, RIPPON, & CO. (at Moretonhampstead).

Moretonhampstead, Devon.—Freehold shop, five building plots, and an enclosure 1 a. 1 r. 33 p. 1,000

By TOMPKINS & Co. (at Reading).

Reading, Berks.—Friar-st., "The Wheatsheaf Hotel," lease and goodwill, u.t. 31½ yrs., r. 250l. 1,565

March 19.—By A. DOWELL (at Edinburgh).

Muir of Ord, Ross-shire.—"Ord Distillery," and 11 acres 15,800

By W. P. SMITH (at Wick).

Latheron, Caithness-shire, "The Latheron Estate," 1,450 acres 7,000

By E. P. NEWMAN (at Uxbridge).

Longford, Middlesex.—"Heaths Orchard" and cottage, f., r. 40l. 750

By REED & GOSS (at Exeter).

Exeter, Devon.—High-st., "Gifford's Hotel," f.... 3,000

By NOTT & CARTWRIGHT (at Balham).

Balham.—1, Dornton-rd., u.t. 77 yrs., g.r. 7l. 10s., r. 35l. 350

70, Fernlea-rd., u.t. 69 yrs., g.r. 7l., r. 28l. 250

By R. W. FORGE (at Kingston).

Teddington.—Coleshill-rd., a plot of land, f. 200

MARCH 20.—By BRANCH & LEETE (at Liverpool).

Liverpool.—Part of 56 and 58 to 66 (even), Lord-st., and 47 and 49, Cable-st., lease and goodwill, u.t. 4½ yrs., r. 1,620l. 17,000

By MORRIS, MARSHALL, & POOL (at Bishop's Castle).
Bishop's Castle, Salop.—"The Harp Inn" and 1a. 0r. 16p., f. £900
Five enclosures of land, 11a., f. 800

By WINTERTON & SONS (at Lichfield).
Lichfield, Staffs.—Quarry Hills, 7 enclosures, 36a. 0r. 27p., f. 1,615

By ROBERT REID.
Regent's Park.—108, 110, 112, and 114, William-st. and 39, Little Albany-st., u.t. 26½ yrs., g.r. 20l. 5s., r. 200l. 2,025
Marylebone.—2, Great Titchfield-st., u.t. 58 yrs., g.r. 10l., r. 215l. 1,820
72, Charlotte-st., u.t. 17 yrs., g.r. 28l., r. 80l. ... 520
1, Upper Ogle-st., u.t. 29½ yrs., g.r. 8l., r. 80l. ... 775

By ALLAN BOOTH.
Holloway.—117, Hungerford-rd., u.t. 65 yrs., g.r. 6l. 6s., r. 40l. 355

By E. G. WOODS.
Victoria Park.—Brookfield-rd., "Victoria Lodge," f., r. 30l. 455

March 23.—By J. W. KEMSLEY.
Hornsey—Tottenham-lane, "Woodside," f. 2,925
Tottenham-lane, a block of freehold building land 550

By KING & CHASEMORE.
Edmonton.—39 to 59 (odd), Tillotson-rd., u.t. 88 yrs., g.r. 57l. 15s. 1,250

By RUTLEY, SON, & VINE.
Caledonian-rd.—14, Delhi-st., u.t. 62 yrs., g.r. 6l. 315
Regent's-park.—79, Regent's Park-road, f., r. 45l. 610
Hornsey-rise.—3, Duncombe-rd., u.t. 64½ yrs., g.r. 8l., e.r. 50l. 440

By S. WALKER & RUNTZ.
Buckhurst-hill.—Queen's-rd., "Challa," f., r. 55l. 700
2, Avondale Villas, f., r. 30l. 390
Queen's-rd., "Kent Lodge," f., e.r. 50l. 700
Holloway.—309, 311, 313, and 329, Camden-rd., u.t. 50 yrs., g.r. 26l., r. 224l. 2,015
Caledonian-rd.—2, Huntingdon-st., u.t. 53 yrs., g.r. 7l., r. 50l. 485

By CURTIS & SHARP (at Stratford).
Stratford.—Chatsworth-rd., a plot of land, f., ... 160

By R. EARL (at Sleaford).
Sleaford, Lincs.—West-st. freehold bank premises "The Ferns" and cottage adjoining, f., ... 1,120
North-st. freehold business premises and three cottages 660

By THOMPSON, RIPPON, & CO. (at Whimple).
Whimple, Devon.—Four freehold cottages and enclosures, 3a. 2r. 6p. 2,583

By FURLONG & SON (at Woolwich).
Woolwich.—3, Havelock-rd., u.t. 29 yrs., g.r. 2l. 10s. 1,150
Plumstead.—163, Eglinton-rd., f., r. 36l. 8s. 120
46, Llanover-rd., and a plot of land, f. 405
Charlton.—17, Delafield-rd., u.t. 71½ yrs., g.r. 4l., r. 32l. 525
Shooter's Hill.—Shrewsbury-lane, a plot of land, f. 300

March 24.—By J. G. HAMMOND, JUNR.
Bromley.—1, 2, and 3, Prospect-pl., u.t. 60½ yrs., g.r. 15l. 120

By ALFRED RICHARDS.
Enfield.—Chase Side, "Rivulet House," f., r. 30l. 105
Shoreditch.—28 and 30, Great Eastern-st., u.t. 61 yrs., g.r. 125l., r. 350l. 500

By BEAN, BURNETT, & ELDRIDGE.
Greenhithe, Kent.—A freehold plot of building land, 1a. 1r. 3,100

By DEBENHAM, TEWSON, & CO.
City of London, Aldermanbury.—F.g.r. 350l., reversion in 62 yrs. 190
Hackney.—Montagu-rd., f.g.r. 15l., reversion in 76 yrs. 9,870
Camberwell.—Warner-rd., f., g.r. 60l., reversion in 12½ yrs., and 28 and 30, Denmark-hill, f., r. 130l., area 34,450 ft. 345
Camberwell New-rd., &c., f.g.r. 45l., reversion in 12½ yrs., area 71,200 ft. 5,000
Valmar-rd., f.g.r. 36l. 15s., reversion in 86 yrs. . 6,850
Morna-rd., f.g.r. 37l. 10s., reversion in 86 yrs. ... 1,140
Crawford-st., f.g.r. 36l. 5s., reversion in 86 yrs. . 1,160
18 to 28 (even), Coldharbour-lane, f., r. 205l. 1,100
New Bond-st.—27 and 29, Brook-st., with stable premises, u.t. 48 yrs., g.r. 11l. 5s. 3,370

By W. W. READ & CO.
Stoke Newington.—6, Gainsborough-rd., u.t. 63¾ yrs., g.r. 5l., e.r. 30l. 5,300
Finsbury Pk.—4, Woodstock-rd., u.t. 71 yrs., g.r. 7l., 10s., r. 30l. 300
Clapton.—56 and 58, Lower Clapton-rd., u.t. 71 yrs., g.r. 24l., r. 105l. 280

By BEALE & CAPPS.
Westbourne Pk.—26, St. Luke's Mews, u.t. 67½ yrs., g.r. 5l., r. 30l. 950
Kensington.—68 and 70, Chesterton-rd., u.t. 55 yrs., g.r. 18l. 18s., r. 105l. 155
Bayswater.—34, Archer-st., u.t. 54½ yrs., g.r. 8l., r. 35l. 665
Kentish Town.—2 to 5, Newberry Mews, u.t. 64 yrs., g.r. 45l. 315
Shepherd's Bush.—22, Bassein-pk., u.t. 69¾ yrs., g.r. 6l., e.r. 26l. 185

By T. NEALE (at Nottingham).
Nottingham.—62, Long-row, f. 175

By HEPPER & SONS (at Leeds).
Leeds.—12, East-parade, and 25 and 27, Park Cross-st., f., r. 236l. 4,100
66 to 72 (even), Portland-cres., f., r. 77l. 6,025
1 to 4, Woodhouse Cliff, and plot of land adjoining, f. 1,455

By E. FERGUSSON TAYLOR (at Barnet).
East Barnet, Herts.—Beverley House and Ivy Cottage, f. and c., r. 54l. 3,020

By HEPPER & SONS (at Headingley).
Headingley, Yorks.—Cardigan-rd., a freehold site, area 1,288 yds. 560

By HOLLAND & ANDREWS (at Chelsea).
Chelsea.—5, Halsey-st., u.t. 47 yrs., g.r. 5l., r. 60l. 483
Brompton.—4, Montpelier-ter., u.t. 54 yrs, g.r. 8l. 8s., r. 75l. 650
Battersea.—15, 16, and 17, Brittania-pl., u.t. 59 yrs., g.r. 12l. 12s. 850

By J. R. MALLAM & SON (at Oxford).
Burford, Oxon.—"Upton Quarries Farm," 21a., f. 230
By JAMES & JAMES (at Swansea).
Loughor, Glamorgan.—A freehold farm and 2a. 1r. 30p. 700
Four enclosures of land, 5a. 3r. 31p., f. 450
Ten building plots, f. 590
March 25.—By HOBSON, RICHARDS, & CO.
Brixton.—40, Tulse Hill, u.t. 22½ yrs., g.r. 12l., r. 45l. 350

By J. A. JONES.
Camberwell.—62, Paulet-rd., u.t. 71½ yrs., g.r. 5l. £450

By PROTHEROE & MORRIS.
Barking.—65 to 85 (odd), St. Mary's-rd., u.t. 87 yrs., g.r. 16l. 10s. 1,315
Forest Gate.—Upton Park-rd., a corner shop and residence, u.t. 84½ yrs., g.r. 6l., r. 35l. 450

By E. W. RICHARDSON & SON.
Hornsey.—17 and 19, Harringay-rd., u.t. 87 yrs., g.r. 9l. 285
Dulwich.—34, Muschamp-rd., u.t. 79½ yrs., g.r. 7l. 7s., r. 30l. 240
Peckham.—1 to 4, Elizabeth-ter., u.t. 75 yrs., g.r. 21l. 635
21, Montpelier-rd., u.t. 63 yrs., g.r. 5l. 15s., e.r. 32l. 230

By HUNTER & HUNTER.
Marylebone.—220 and 222, Great Portland-st., and 64, Bolsover-st., u.t. 19 yrs., g.r. 40l., r. 179l. ... 1,380
Bayswater.—62, Burlington-rd., u.t. 63 yrs., g.r. 12l. 335

By TERSON & SON.
Bloomsbury.—35, Alfred-pl., u.t. 8 yrs., g.r. 8l. 16s. 6d., r. 80l. 300
Rotherhithe.—1 to 11, Claremont-pl., u.t. 12 yrs., g.r. 30l. 730

By DOUGLAS YOUNG.
Kilburn.—2 to 8 (even), Douglas-rd., u.t. 89½ yrs., g.r. 25l. 4s., r. 137l. 1,200
1 and 10, Douglas-rd., u.t. 90 yrs., g.r. 12l. 12s., r. 69l. 615

By GREEN & SON (at Hammersmith).
Barnes.—37, Castlenau Villas, u.t. 33 yrs., g.r. 5s., r. 75l. 860

By R. M. TATE (at Newcastle).
Whitley, Northumberland.—An enclosure of land, 15a., f. 1,950
Plot of building land, 1,300 yds., f. 350

By LACY, SCOTT, & SON (at Bury St. Edmunds).
Whepstead, Suffolk.—"The White Horse Inn," and enclosures, 33a. 1r. 17p., f. 670

By BOULTON & COOPER (at Malton).
Norton, Yorks.—Three building sites, area 16,761 yds., f. 920
Two enclosures of land, 6a. 3r. 5p., f. 605

March 26.—By T. G. WHARTON.
East Ham.—23 to 45 (odd), Kelly-rd., u.t. 82½ yrs., g.r. 37l. 16s. 700
Harrow.—Headstone-rd., 5 building plots, f. 300

By DYER, SON, & HILTON.
Blackheath.—3, Woodville-rd., u.t. 69 yrs., g.r. 10l., e.r. 65l. 500
4, Haddo-villas, u.t. 56 yrs., g.r. 5l. 575

By ERNEST OWERS.
Hampstead.—20, Solent-rd., u.t. 93 yrs., g.r. 6l. 11s. 6d., r. 34l. 370

By C. C. & T. MOORE.
Bow.—7 to 15, Beale-rd., and 1 and 3, Chad-st., u.t. 67½ yrs., g.r. 35l. 1,120
97 and 99, St. Stephen's-rd., f., r. 48l. 2s. 500
46 and 48, Ford-rd., f., r. 44l. 4s. 500
Beale-rd., &c., f.g.r. 35l. reversion in 67 yrs. 910
Brockley.—Ewart-rd., f.g.r. 10l., reversion in 70 yrs. 250
Hackney.—14 and 16, Brunswick-st., u.t. 47½ yrs. g.r. 2l. 5s. 205
Homerton.—137 to 143 (odd), High-st., u.t. 14¾ yrs. gr.r. 35l. 165
55 to 61, Holmbrook-st., and 23, Belsham-st., u.t. 27 yrs., g.r. 12l. 10s. 250
Walthamstow.—48, Grove-rd., f., e.r., 38l. 515
Grove-rd., 2 plots of building land, f. 145
Hopton.—1 and 3, Whitmore-rd., u.t. 23 yrs., g.r. 4l. 0s. 6d., r. 48l. 300
Spitalfields.—39 and 40, Gun-st., f., r. 156l. 1,305
Islington.—40 and 42, Oxford-rd., u.t. 56½ yrs., g.r. 10l. 16s., r. 80l. 810
Leyton.—Wilmot-rd., "Portland Villa," f., r. 20l. 315

[*Contractions used in these Lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent, r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.

PRICES CURRENT OF MATERIALS.

TIMBER.

Greenheart, B.G.	ton	8/0/0 0/0/0
Teak, E.I.	load	11/0/0 26/0/0
Sequoia, U.S. ft. cu		1/10 2/0
Ash, Canada	load	3/10/0 4/15/0
Birch, do.		3/5/0 5/0/0
Elm, do.		4/5/0 5/10/0
Fir, Dantsic, &c.		1/15/0 3/5/0
Oak, do.		2/5/0 3/15/0
Canada		6/5/0 7/15/0
Pine, Canada red		0/0/0 0/0/0
Do. Yellow		3/0/0 5/5/0
Lath, Dantsic, fath		4/10/0 5/10/0
St. Petersburg		5/0/0 6/10/0
Wainscot, Riga, &c., log		2/10/0 4/15/0
Odessa, crown		2/10/0 4/15/0
Deals, Finland 2nd & 1st std 100		7/10/0 9/0/0
Do. 4th & 3rd		7/10/0 8/10/0
Do. Riga		7/10/0 8/10/0
St. Petersburg, 1st yellow		10/0/0 12/10/0
Do. 2nd yellow		8/0/0 10/0/0
Do. white		8/10/0 10/0/0
Swedish		7/10/0 16/0/0
White Sea		8/0/0 15/0/0
Canada, Pine 1st		23/5/0 23/10/0
Do. do. 2nd		16/0/0 17/0/0
Do. do. 3rd, &c.		8/0/0 10/15/0
Do. Spruce, 1st		9/0/0 10/10/0
Do. do. 3rd and 2nd		7/0/0 8/0/0
New Brunswick		6/10/0 7/10/0
Battens, all kinds		5/0/0 20/0/0
Flooring boards, sq., 1 in. prep. 1st		0/10/0 0/15/0
Do. 2nd		0/6/6 0/12/0
Other qualities		0/5/6 0/7/0
Cedar, Cuba ...ft.		/4½ /5
Honduras, &c.		/4 /5
Mahogany, Cuba		/3½ /6
St. Domingo, cargo av.		/4 1/3
Mexican do. do.		/4 /4½
Tobasco do. do.		/5 /7
Honduras do.		/5 /6½
Box, Turkey	ton	4/0/0 15/0/0
Rose, Rio		7/0/0 16/0/0
Bahia		6/0/0 15/0/0
Satin St. Domingo		0/0/7 0/1/0

TIMBER *continued*.

Satin, Porto Rico		0/0/7 0/1/6
Walnut, Italian		0/0/3 0/0/7

METALS.

Iron—Pig, in Scotland	ton	2/6/10½ 0/0/0
Bar, Welsh, in London		5/12/6 5/15/0
Do. do. at works in Wales		5/2/6 5/5/0
Do. Staffordshire, in London		6/0/0 6/10/0
COPPER—British cake and ingot		40/5/0 49/10/0
Best selected		50/10/0 51/0/0
Sheets, strong		56/0/0 0/0/0
Chili bars		45/12/6 45/17/6
YELLOW METAL		0/0/4½ 0/0/5
LEAD—Pig, Spanish	ton	11/3/9 11 6/3
English com. brands		11/7,6 11/8/9
Sheet, English, 6 lbs. per sq. ft. and upwards		12/0/0 0/0/0
Pipe		12/10/0 0/0/0
ZINC—English sheet	ton	18/5/0 0/0/0
Vieille Montagne		18/5/0 0/0/0
TIN—Straits		60/2/6 60/12/6
Australian		60/17/6 61/7/6
English Ingots		64/0/0 64/5/0
Banca		61/0/0 61/5/0
Billiton		60/10/0 60/12,6

OILS.

Linseed	ton	18/15/0 19/7,6
Cocoanut, Cochin		26/15/0 0/0/0
Do. Ceylon		0/0/0 0/0/0
Palm, Lagos		21/10/0 0/0/0
Rapeseed, English pale		24/5/0 24/10/0
Do. brown		22/15/0 23/5/0
Cottonseed ref.		16/5/0 16/10/0
Oleine		19/10/0 20/15/0
Lubricating U.S.		6/6/0 9/0/0
Do. black		4/9/0 6/6/0
TAR—Stockholm barrel		1/0/0 0/0/0
Archangel		0/14/6 0/15/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays*. N.B.—We cannot publish Tenders unless authenticated by the name and address of the sender: and we cannot publish lists in which the accepted Tender is below £100, unless in some exceptional cases and for special reasons.]

ASTON CLINTON (Bucks).—For work in connexion with the erection of a villa residence at Aston Clinton, Bucks, exclusive of bricks, lime, sand, and all plumbing, glazing, and painting, Mr. Guest Luckett, architect, Aylesbury:—

Sherwin	£396 0 0	Grimsdale	£315 0 0
Senior & Clarke	385 0 0	Read	310 0 0
Crook & Sons	351 9 6	S. Grist, Limited	288 0 0
Fincher	325 0 0		

CHEAM (Surrey).—For building stabling and coachman's residence. Mr. R. Langton Cole, architect:—

W. I. Wells	£839	J. B. Potter	£763
W. Killick	770	Balchin & Shopland*	657

* Accepted.

HETTON-LE-HOLE (Durham).—For the erection of a Conservative clubhouse for the Hetton Conservative Clubhouse Company, Limited. Mr. Frank Caws, architect, 22, Fawcett-street, Sunderland. Quantities by Messrs. Boreham & Morton, Baltic Chambers, Sunderland:—

Draper & Sons	£1,992 19 5	J. G. Bradley	£2,162 10 0
George Stewart	2,224 0 0	G. Gradon & Son	2,123 7 6
J. B. Stott	2,001 0 2	Stephen Branton, Sunderland*	1,779 10 0
Joseph Huntley	2,050 0 0	P. B. Bradley	2,178 0 0
Isaac Oates	2,065 0 0	William Elstol	2,132 0 0
John Robson	2,059 10 0	W. H. Girven	2,358 0 0
James Tremble	2,452 11 0	R. D. Harrison	2,071 0 0
Turner Brothers	2,186 0 9	*Accepted.	
G. T. Manners	2,959 0 0		

LEEK.—For heating the workhouse infirmary, Leek, for the Leek Guardians. Mr. J. T. Brealey, architect, Hanley:—

Ward & Lock	£638	Jones & Attwood	£490
Morwood & Son	545	Rosser & Russell	478
E. Lowndes	514	Trusswell & Son, Sheffield*	470

* Accepted.
[Architect's estimate, £500.]

LEEK (Staffs.).—For the erection of market, &c., for the Urban District Council. Mr. John T. Brealey, architect, 1, Stockwell-street, Leek. Quantities by architect:—

Fire Station and Lock-up Shops.

J. Fielding	£2,275 7	H. P. Embrey	£1,927 0
C. Cornes	2,080 0	Heath & Lowe	1,909 0
J. Heath	1,966 0	T. Grace, Leek*	1,796 0

[Architect's estimate, £1,907.]

Butter Market Lock-up Shops, &c.

C. Cornes	£2,620	J. Heath	£2,394
J. Fielding	2,577	Heath & Lowe	2,332
H. P. Embrey	2,449	T. Grace, Leek*	2,289

* Recommended for acceptance.
[Architect's estimate, £2,476.]

LLANHILLETH (Mon.).—For forming and ballasting roads, sewers, surface-drains, &c., Llanhilleth, Mon., for Dr. W. E. Williams, J.P. Mr. C. Telford Evans, architect and surveyor, 8, Queen-street, Cardiff:—

George Jenkins	£1,094 16 10	Batchelor & Snowden	£679 7 11
Thos. Goldsworthy	1,076 12 0	Williams & Thomas	649 0 0
Thomas Harries	923 14 9	T. J. Davies	627 18 9½
A. M. Scott	785 0 0	E. Moore	564 4 10
Barnes, Chaplin, & Co.	693 13 2	B. Evans, 41, The Walk, Cardiff*	557 4 3

* Accepted.

LONDON.—For new house in Conewood-street. Mr. E. J. Harrison, architect:—

Ward & Lamble	£749 0	Marsden	£679 10
Derling	722 0	Eddis	672 0
Houghton	720 0	Wills	510 0
Hawkins & Wright	693 0		

LONDON.—For alterations and additions to factory, Deptford, for Messrs. Stone & Co. Messrs. Stock, Page, & Stock, architects. Quantities by Messrs. Widnell & Trollope:—

Kyder & Son	£3,372	H. L. Holloway	£3,170
T. T. Leng	3,280	Dove Bros	2,975
Outhwaite & Son	3,194	A. White & Co.*	2,955
B. E. Nightingale	3,189	* Accepted.	

LONDON.—For building new stabling at Trundley-road, Deptford, for Messrs. Francis & Son. No quantities:—

Parsons	£657	A. White & Co.	£557
J. O. Richardson	566	S. Chafen	375

LONDON.—For erecting business premises and for alterations at High-road, Streatham, for Messrs. Pratt Brothers. Mr. Albert E. Pridmore, architect. Quantities supplied by Mr. G. T. G. Wright:—

	A.	B.	Total.
H. Leney	£4,416	£220	£4,636
S. R. Lamble	4,296	195	4,491
Killby & Gayford	4,221	200	4,421
Prestige & Co.	4,213	177	4,390
G. Candler & Sons	4,200	183	4,383
W. Mason	4,195	177	4,372
H. King (too late)	4,120	197	4,317
Geo. Parker	4,095	219	4,314
Beer & Gash	3,987	170	4,157*

* Accepted.

LONDON.—For lighting with electricity the new fire engine station in Tabernacle-square, Shoreditch, for the London County Council.

A. W. Jackson	£248 10 0	Drake & Gorham	£186 5 6
Pritchetts & Gold	228 0 0	Russell & Lennard*	173 15 0
Crompton & Co., Ltd.	219 0 0	*Recommended for acceptance.	

LONDON.—Accepted for the erection and completion of eight houses in Byne-road, S.E. Mr. William G. Ingram, architect, 44, Theobald's-road, Bedford-row, W.C.:—

H. Pharaoh £3,800

LONDON.—For alterations to the "Railway Tavern," for Messrs. J. Smith & Son. Mr. William G. Ingram, architect, 44, Theobald's-road, Bedford-row, W.C.:—

J. Parsons	£305	Maxwell Bros.	£295

LONDON.—Accepted for the erection and completion of a house for Mr. J. C. Tomlins, at East Finchley. Mr. William G. Ingram, architect, 44, Theobald's-road, Bedford-row, W.C.:—

F. Heatherly £870 0

[No competition.

LONDON.—For rebuilding shops Nos. 66 and 67, New Bond street, for Messrs. Duveen & Newman. Messrs. Romaine, Walker, & Tanner, architects :—

Higgs & Hill	£15,318	H. & E. Lea	£13,385
P. S. S. Williams & Son..	14,036	E. Lawrence & Sons	13,191
Clark & Bracey.....	13,710	Holloway Bros.	13,132
Howell J. Williams	13,615	F. & H. F. Higgs.....	12,930
Patman & Fotheringham	13,525	Allen & Sons	12,425
H. Lovett	13,398	H. L. Holloway	12,368

LONDON.—Accepted for relaying drains at Nos. 215, 217, 219, and 14 and 16, Fort-road, S.E., for Mr. T. Jones. Mr. William G. Ingram, architect, 44, Theobald's-road, Bedford-row, W.C. :—

J. Parsons £124 0 0

LONDON.—For rebuilding warehouse at Margret-street, Hackney. Mr. H. H. Tasker, architect, 58, Penton-street, N. :—

Kilby & Gayford	£2,232	Dearing	£1,756
Lawrence	1,950	Pavey	1,749
Beer & Gash	1,871	Barrett & Power	1,717
Reason	1,799		

LONDON.—For rebuilding warehouse at Chapel-street, Islington. Mr. H. H. Tasker, architect, 58, Penton-street, N. :—

Beer & Gash	£1,542	Hunt	£1,387
Lidstone	1,514	Reason	1,375
Lawrence	1,510	Dearing	1,290
Shurmur	1,422		

PINNER (Middlesex).—For new business premises, for Messrs' H. Kingham & Sons, of Watford. Mr. C. P. Ayres, architect, 14, High-street, Watford :—

A. J. Batchelor	£1,230	G. & J. Waterman.....	£1,095
C. Brightman	1,120	Brown & Sons, Harefield *	1,025

* Accepted conditionally.

ROCKINGHAM.—For the erection of school buildings, Cottingham. Mr. J. C. Traylen, architect, 16, Broad-street, Stamford :—

E. Patrick	£385 0 0	J. Simpson	£336 3 6
T. Hickman.....	350 0 0	S. F. Halliday	320 0 0
G. W. Stangar.....	327 0 0	W. Dean, Uppingham*	268 0 0

* Accepted.

WATFORD (Herts.)—For the erection of new schools, Fearnley-street, for the Watford School Board. Mr. C. P. Ayres, architect, 14, High-street, Watford. Quantities by Mr. H. J. Griggs :—

Willmott & Sons	£10,363	S. H. Gibson	£8,884
T. Turner, Limited	9,733	G. & J. Waterman	8,884
Brown & Sons	9,725	F. Dupont	8,795
G. Wiggs	9,016	Webster & Cannon	8,781
C. Eames	8,997	Andrews & Sons	8,650
W. Judge	8,890	C. Brightman, Watford*..	8,495

* Accepted, subject to approval of Education Department.

WITLEY (Surrey).—For new entrance hall at Combe Court, for Mr. G. H. Pinckard. Mr. C. P. Ayres, architect, 14, High-street, Watford :—

Waring & Sons,.Ltd.....	£1,842	F. Milton, Witley*	£1,405
Thos. Turner, Ltd.	1,501		

*Accepted.

LONDON.—For making-up and forming the following roads, for the Lewisham Board of Works :—

—	Bryden-grove.	Elvino-road.	Broseley-grove.	Dalrymple-road.	Hillmore-grove.	Laleham-road.
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
R. Lake, jun.	278 12 0	216 10 0	528 10 0	910 0 0	463 10 0	520 0 0
T. Adams.....	266 18 6	218 4 11	505 4 6	831 10 6	397 1 3*	—
Mowlem & Co.	262 0 0	212 0 0	497 0 0	770 0 0	464 0 0	563 0 0
H. Woodham	257 0 0	205 0 0	483 10 0	718 0 0	457 10 0	526 0 0
Fry Bros.....	249 0 0*	205 0 0*	479 0 0*	729 0 0*	439 0 0	509 0 0*

* Accepted.

LONDON.—For alterations, &c., and additional new slipper baths, to St. Bride's Institute, Bride-lane, E.C. Mr. R. Murray, architect, Racquet-court, Fleet-street :—

Latimere	£480	Reason	£375
Patman & Fotheringham ..	420	H. Wall	344

LONDON.—For rebuilding warehouse at 110 and 111, Bermondsey-street, S.E. Mr. G. Sherrin, architect, 33, Finsbury Circus :—

Diggs	£1,162	Wells	£1,075
Williams	1,157	Sabey & Son	1,039
Shepherd	1,125	Greenwood	1,024
Holloway	1,100	Reason*	1,022
Josler & Young	1,096		

* Accepted.

LONDON. — For alterations and additions at North-street, Plaistow. Mr. W. S. Walker, architect, 5, West-street, Finsbury Circus :—

Reason	£5,386	Harris & Wardrop.....	£4 723
Faulkner	5 347	Gregar	4.666
Hoskins	5 189	Chapman	4.557
C. Wallis	4,987	Outhwaite (accepted)	4.295

LONDON. — For repairs and additions at Church-street, Deptford. Mr. J. J. Downes, architect, Lewisham High-road, S.E. :—

Jerrard & Son	£1,098	Holloway	£1.085
Long	1,094	Reason	995

NEWCASTLE-ON-TYNE.—For a block of offices, Quayside, for Mr. Thomas Robson. Messrs. Badenoch & Bruce, architects, 21, Pilgrim-street, Newcastle-on-Tyne :—

John Ferguson £1,871	8 9	N. W. Maughan....£1,763	19 8
Thos. Weatheritt .. 1,797	9 2	Walter Baston..... 1,709	7 0
E. & F. George 1,773	17 0	John Jackson*..... 1,533	12 4
James Smart 1,770	15 0		

* Accepted.

PINNER (Middlesex).—For erecting new slaughter-house, for Mr. J. E. Lee. Mr. C. P. Ayres, architect, 14, High-street, Watford :—

A. J. Batchelor	£230	G. & J. Waterman.....	£180
C. Brightman	189	Brown & Sons, Harefield*..	160

* Accepted.

RADCLIFFE (Manchester).—Accepted for the extension to Messrs A. & J. Hoyle's works at Radcliffe, near Manchester. Messrs. Maxwell & Tuke, architects, Manchester :—

John Allen, Radcliffe £1,594

TO CORRESPONDENTS.

F. H. S.—M. & F. (amounts should have been stated). J. F. H.—H. S. (Too late: next week).

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

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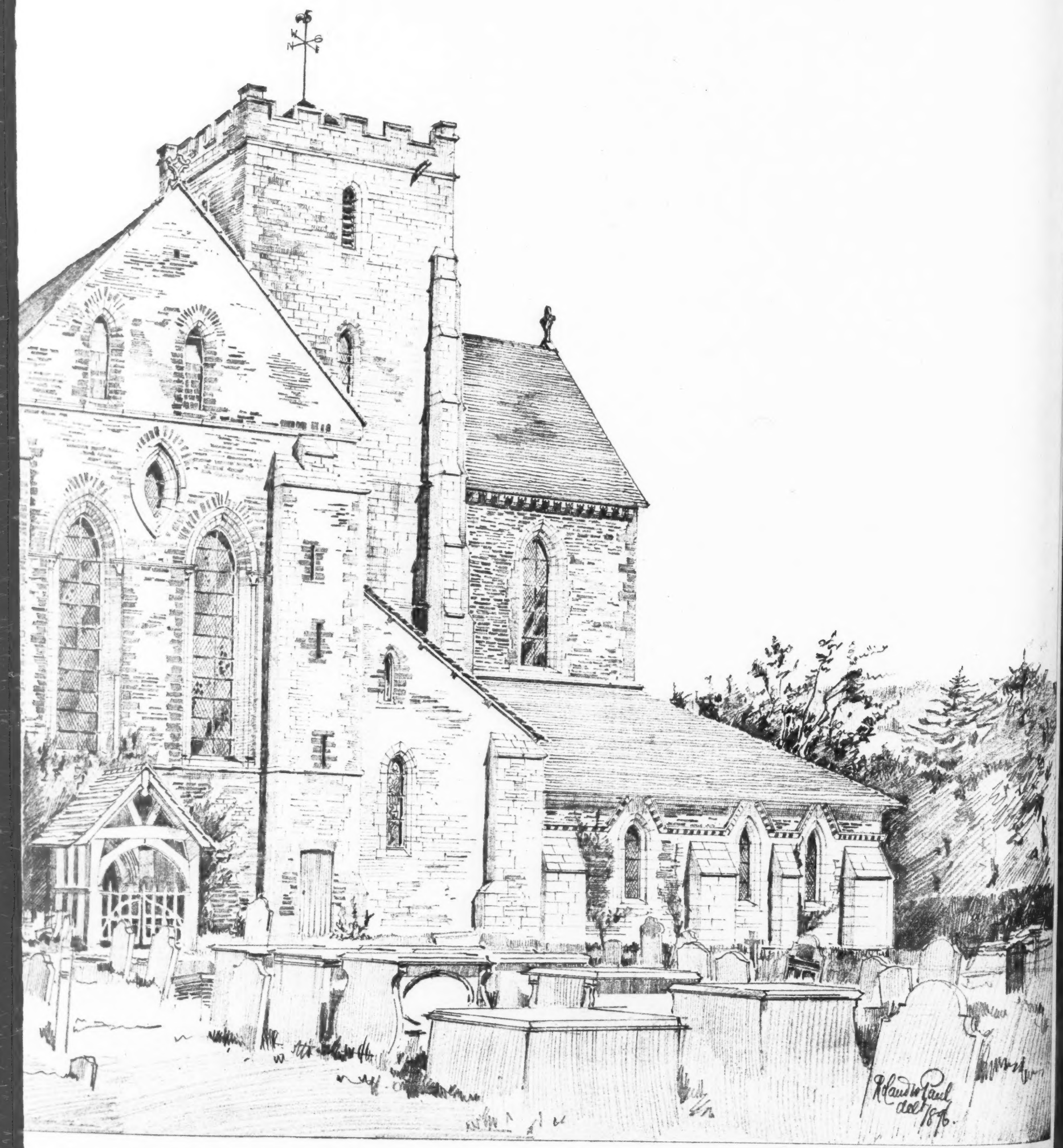

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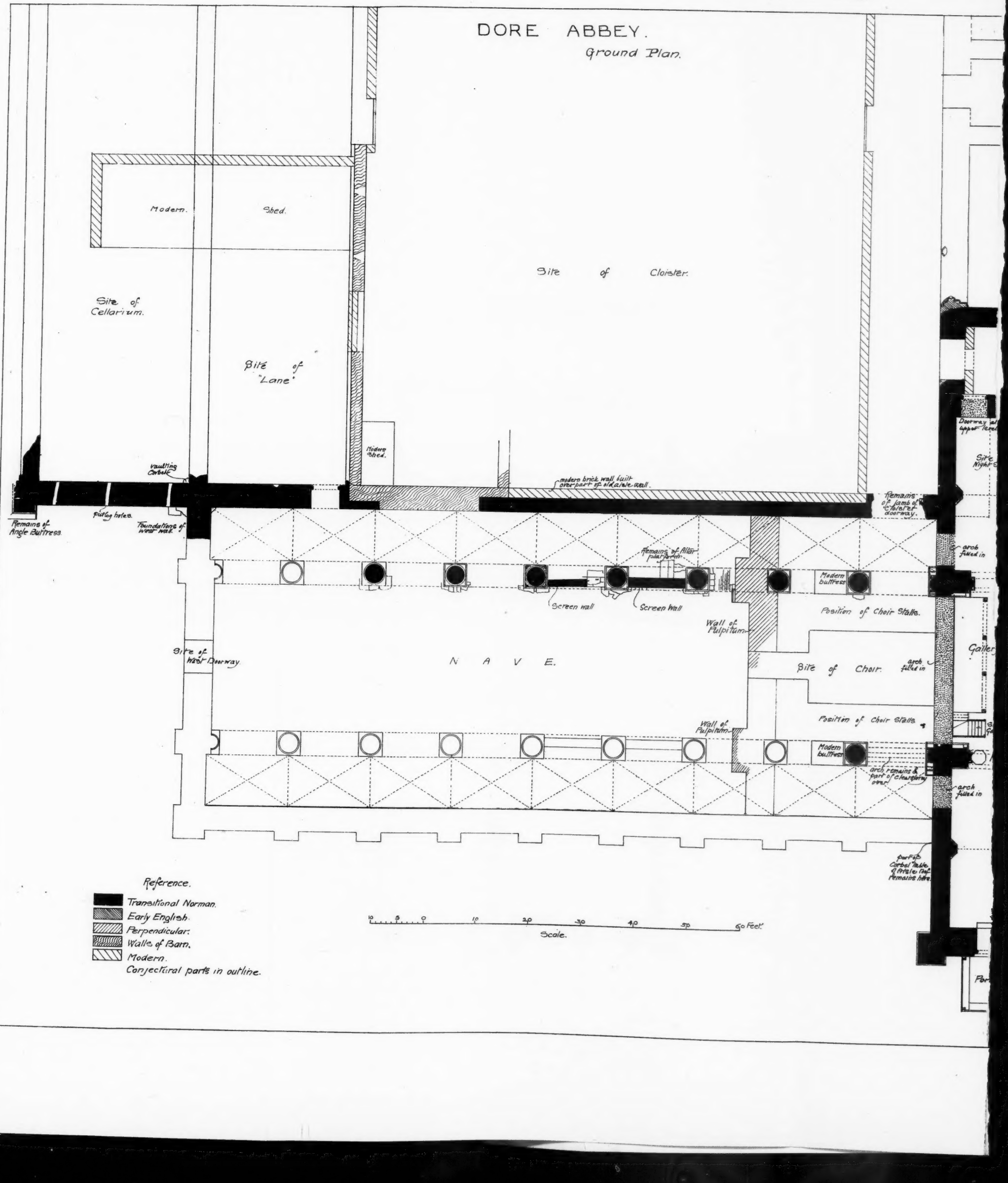
DORE ABBEY.

Ground Plan.



ABBEY.

Ground Plan.

of Cloister.

Site of Vestibule.

Site of Chapter House.

foundations.

Sacristy.

Doorway at upper level

Doorway at floor level.

Site of Night Stairs.

Aumbry

brick wall built on part of old cloister wall.

Remains of jamb of Cloister doorway.

NORTH TRANSEPT.

Remains of Altar & altar-piece

Modern buttress

arch filled in

Screen wall

Position of Choir Stalls.

Wall of Pulpitum

Gallery (1634).

Site of Choir.

arch filled in

Screen (1634)

PRESBYTERY.

Step

Altar.

Position of Choir Stalls

Wall of Pulpitum

Stair to Gallery.

Modern buttress

Font

arch remains & part of Cloister arch

arch filled in

SOUTH TRANSEPT.

Aumbrey

Aumbrey

Part of Corbel Table of Cloister roof remains here.

Tomb of Sergeant Hoskyns.

Recess

Aumbrey & Credence

Porch.

40 30 60 Feet.

Diminutive Effigy of a Bishop.

Effigy of a Knight.

Effigy of a Knight.

Richard de Pauls measd. et delt 1895.

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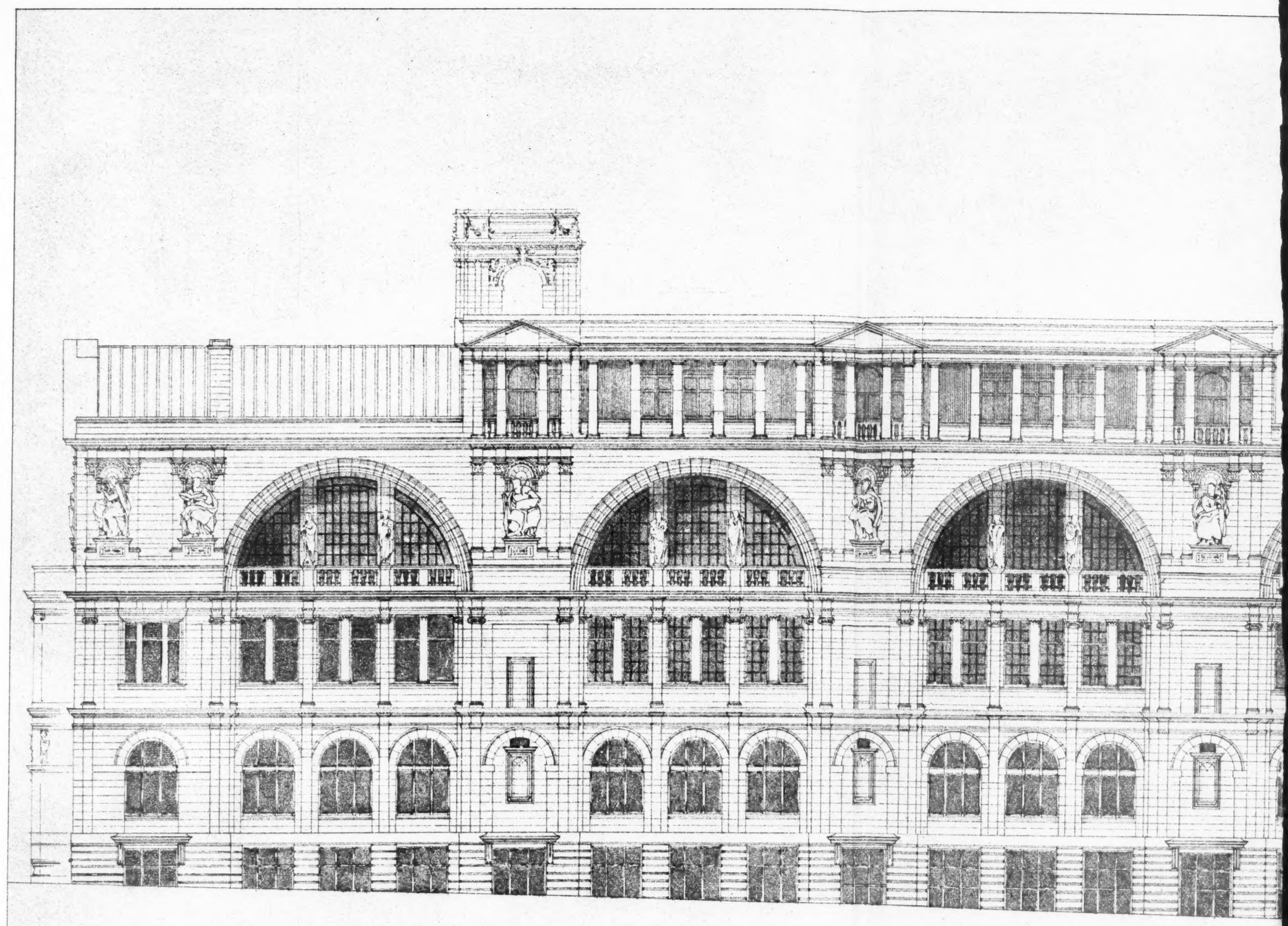

ELEVATION TO NORTH JOHN STREET

SCALE OF FEET

10 0 10 20 30 40 50

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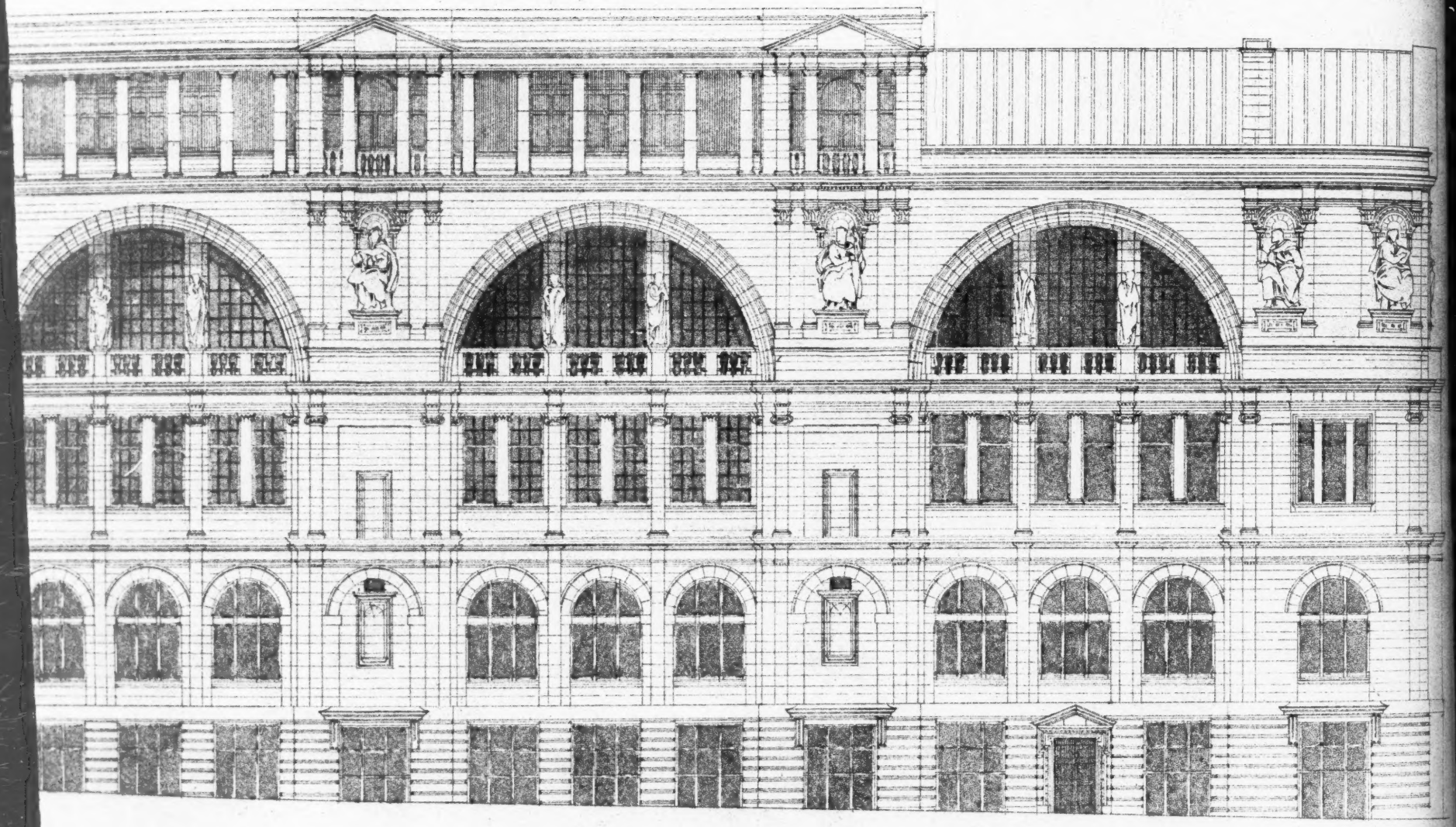

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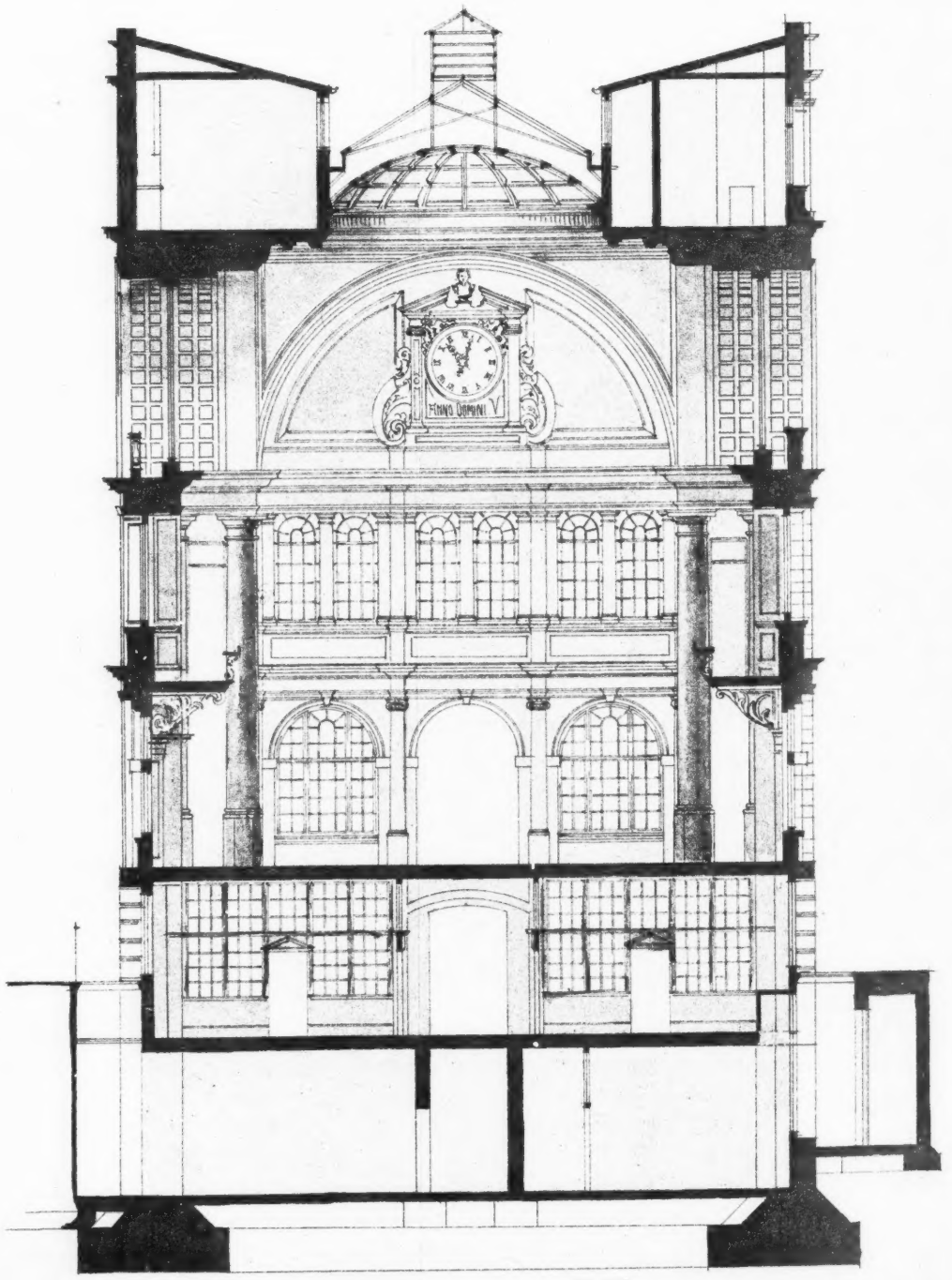
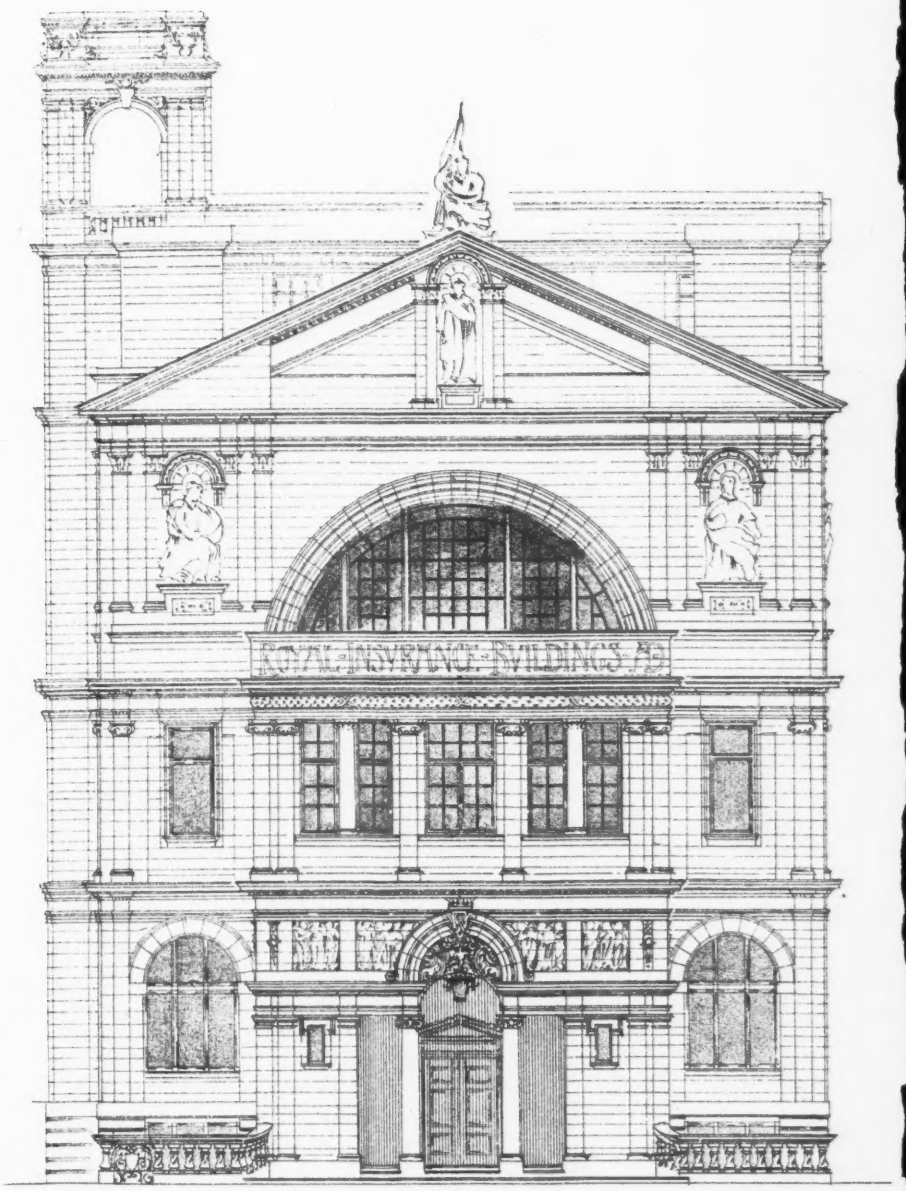


CROSS SECTION



ELEVATION TO DALE STREET

SCALE OF FEET

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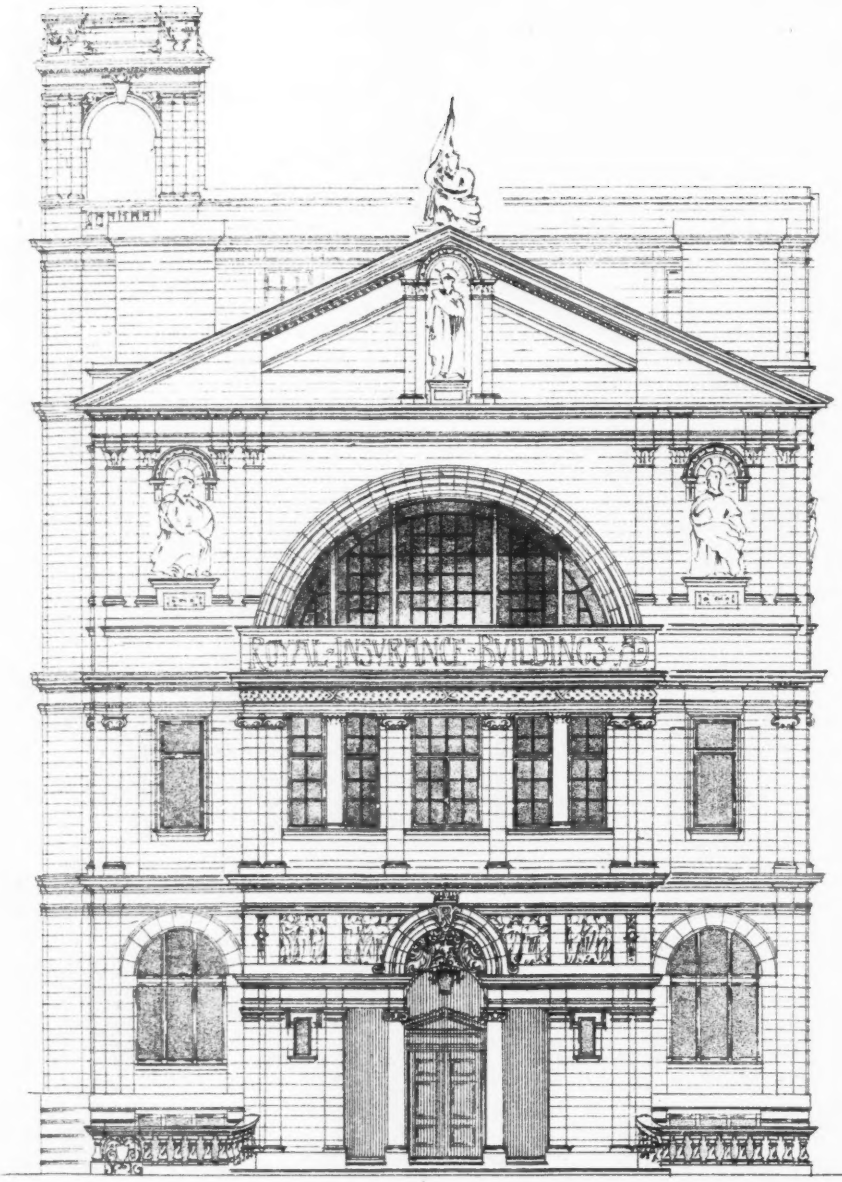

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SCALE OF FEET
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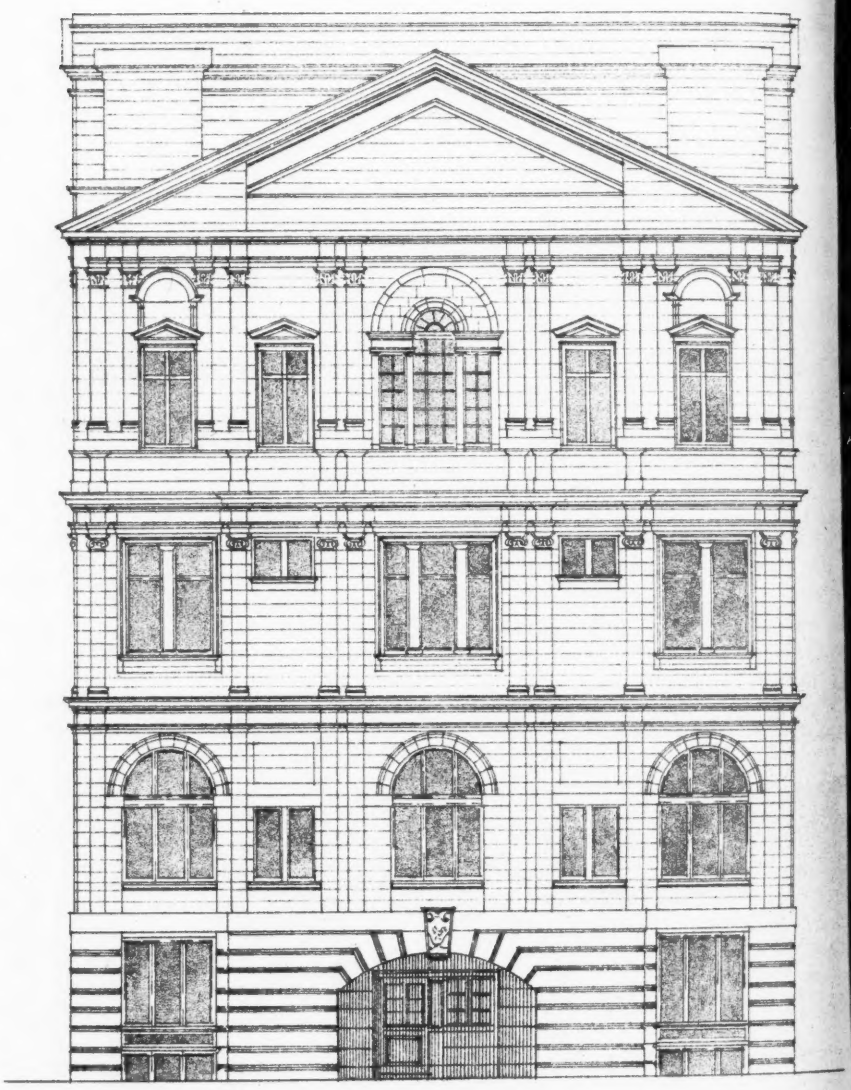

ELEVATION TO SIDE STREET

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